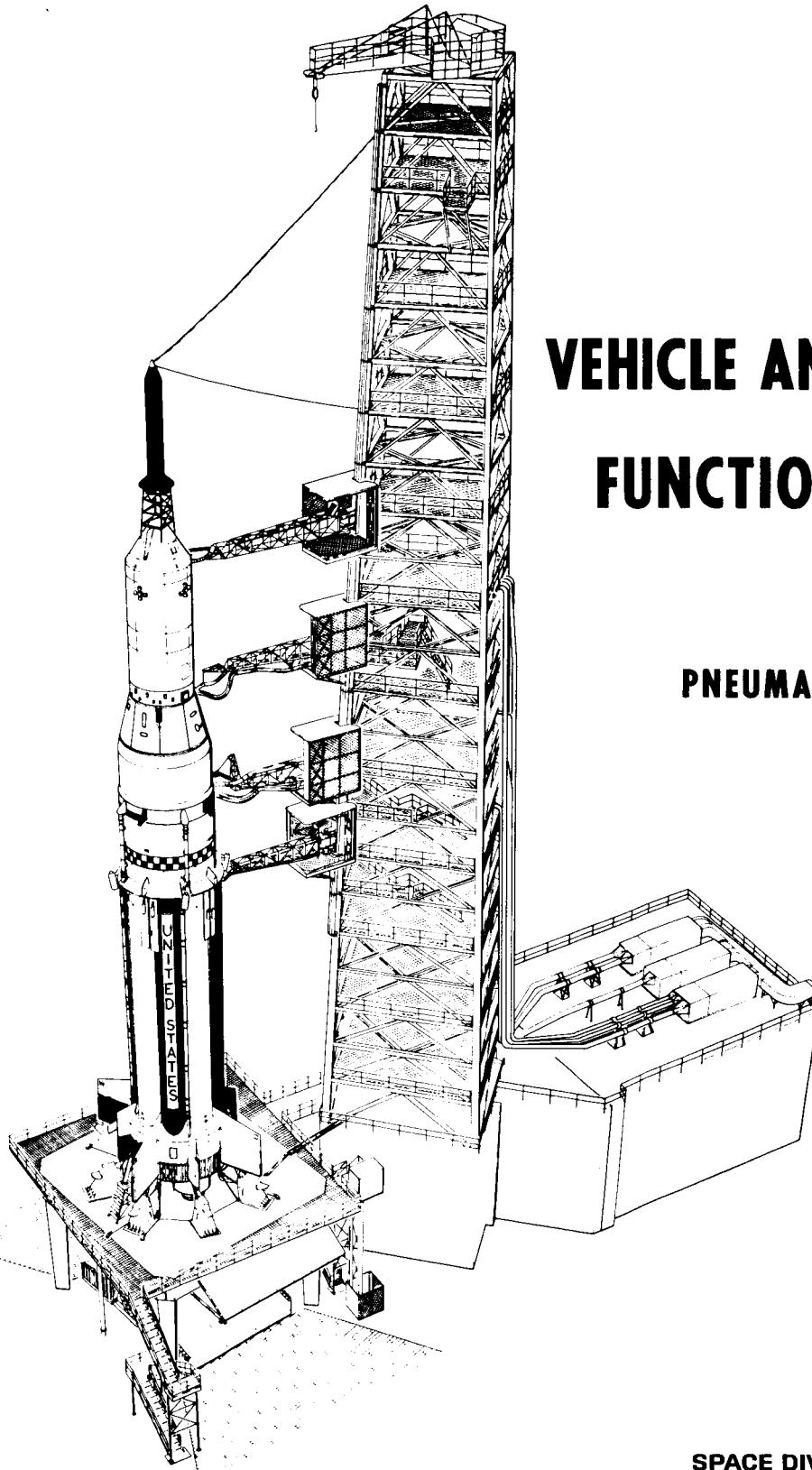


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PNEUMATIC DISTRIBUTION SYSTEM

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HUNTSVILLE OPERATIONS

**HEC-D042
VOLUME V**

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PNEUMATIC DISTRIBUTION SYSTEM

MAY 1964

ENGINEERING COMMUNICATIONS DEPARTMENT



HUNTSVILLE OPERATIONS

FOREWORD

This volume has been prepared for the Functional Integration Section, Systems Integration and Operations Branch, Vehicle Systems Division, Propulsion and Vehicle Engineering Laboratory, by the Engineering Communications Department, Chrysler Corporation Space Division, under contract number NAS8-4016.

The following series, of which this volume is a part, functionally describes the mechanical and electromechanical systems of Saturn I, SA-9 space vehicle and Launch Complex 37:

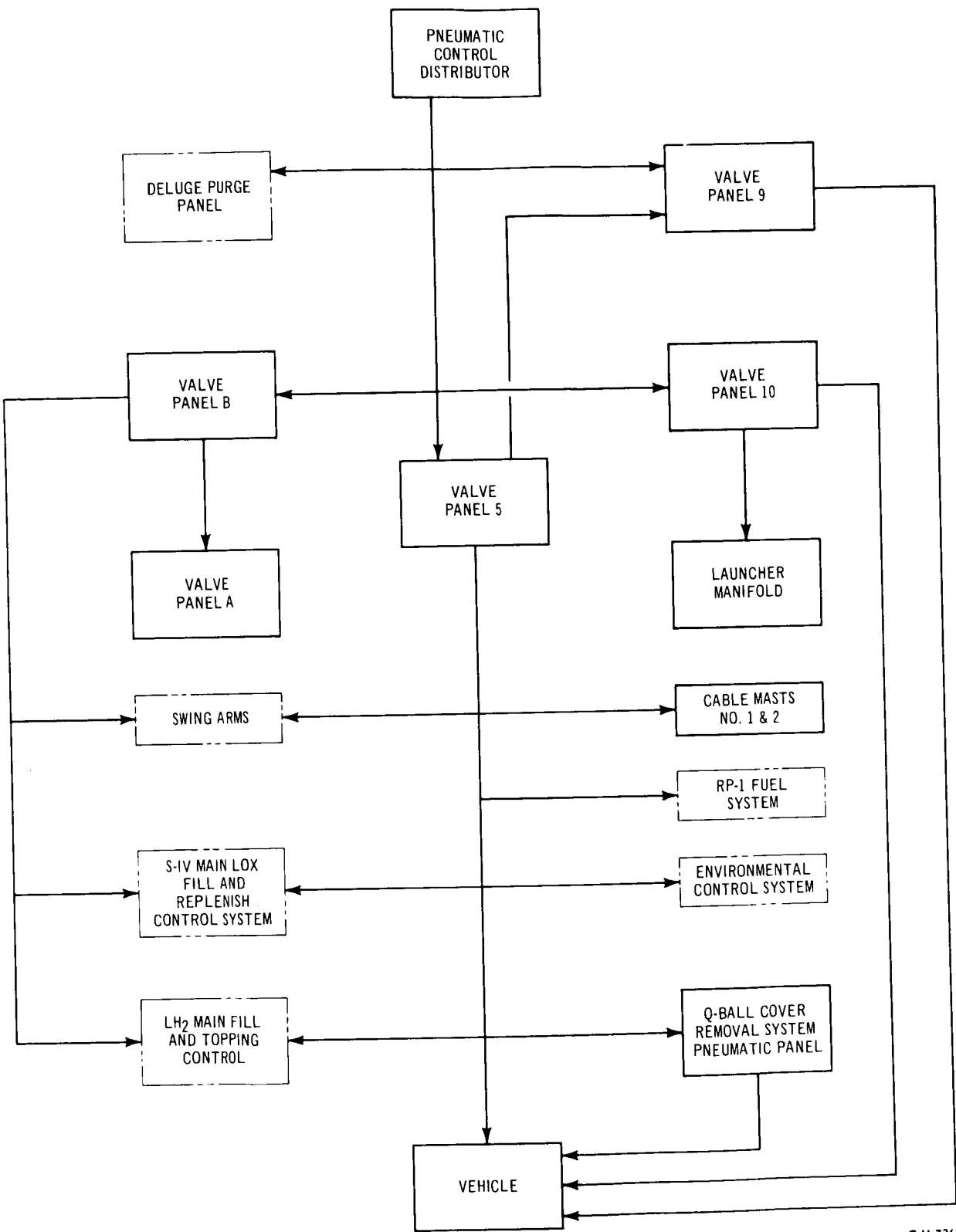
- Volume I. RP-1 Fuel System
- Volume II. LOX System
- Volume III. LH₂ System
- Volume IV. Nitrogen and Helium Storage Facility
- Volume V. Pneumatic Distribution System
- Volume VI. Environmental Control System
- Volume VII. Launch Pad Accessories
- Volume VIII. H-1 Engine and Hydraulic System
- Volume IX. RL10A-3 Engine and Hydraulic System
- Volume X. Separation and Flight Termination Systems
- Volume XI. Supplement: Legend and Composite Schematic

Each volume contains mechanical schematics and a list of applicable finding numbers.

Volume V describes those components that are active during countdown, launch, and flight: it specifically excludes maintenance and checkout procedures. Only information available by April 14, 1964, has been included.

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C-H 7367

FIGURE 1. GN₂ DISTRIBUTION BLOCK DIAGRAM

1. PNEUMATIC DISTRIBUTION SYSTEM

The pneumatic distribution system at Launch Complex 37, Pad B, receives 6000-psig gaseous nitrogen (GN_2) and helium from the nitrogen and helium storage facility described in Volume IV. The pneumatic distribution system supplies the GN_2 (figure 1) and helium (figure 2) at various pressures to the ground and vehicle systems for control, pressurization, and purging operations. The major units in the pneumatic distribution system are the pneumatic control distributor (PCD); valve panels 5, 9, 10, A, and B; a helium precool heat exchanger; and a Q-Ball cover removal system. The Q-Ball, which is a back-up system to the accelerometer control (angle of attack) system, is not part of the pneumatic distribution system, but is described in conjunction with the Q-Ball cover and removal system.

The PCD and valve panels 5 and 10 are located in the automatic ground control station (AGCS). Valve panels 9, A, and B; the helium precool heat exchanger; and the Q-Ball cover removal pneumatic panel are located on the umbilical tower.

The pneumatic distribution system primarily filters, regulates, controls, and monitors the GN_2 and helium as it flows through the various systems. Manual valves are provided throughout the system to isolate components when necessary. Manual vent valves vent their respective lines and in some instances a check valve will be located in the vent line to prevent reverse flow of gases into a system after venting ceases. Pressure gages are located throughout the system for local monitoring of pressure. Transducers provide electrical signals proportional to system conditions to remote panels that contain indicators that display the information. Orifices and snubbers are used extensively to reduce flowrates and pressures, and to protect components and lines from pressure surges. Solenoid valves provide remote control capabilities for system operations. Relief valves, burst discs, and surge suppressors have been installed where necessary to provide overpressure protection and pressure surge protection for the system lines and components. Shuttle valves and three-way manual valves provide calibration points for pressure switches, gages, transducers, and other electromechanical components.

Regulators of various types reduce pressures to the prescribed operational requirements.

Manually adjusted regulators in this system are adjusted by turning the handwheel or handle. Usually these regulators are adjusted prior to each operation and are closed when the operation has been completed. Manually adjusted regulators are used primarily where a relatively small volume of gas is required in both high and low pressure systems.

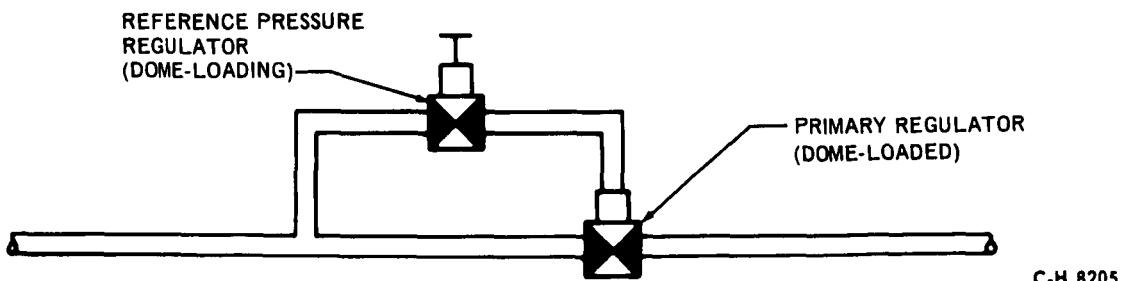
A preset pressure regulator usually requires the use of tools to perform the adjustment. Once adjusted, the regulator maintains the same output

pressure each time the system is placed in operation. The regulators require no other adjustment unless the output pressure becomes either too low or too high.

A remotely adjusted pressure regulator is basically the same as a manually adjusted regulator except that solenoid valves within the regulator are used to adjust the opening of the regulator. The solenoid valves provide remote control capability, which allows pressure to be increased or decreased by positioning a switch on a control panel in the LCC. A pressure transducer usually will be located downstream from the regulator to provide remote monitoring of the output pressure.

Dome-loaded regulators are used to provide accurate pressure control of large volumes of gases flowing through the distribution system. An external signal pressure applied to the regulator dome acts against a diaphragm, which in effect adjusts the output pressure of the regulator. The output pressure is usually equal to the signal pressure applied to the regulator dome. As in most regulators, the dome-loaded regulator has internal sensing ports that allow the regulated pressure to act against the diaphragm in the dome in opposition to the signal pressure. A decrease in downstream pressure will cause further opening of the regulator and an increase in downstream pressure will cause partial closing of the regulator. Depending on system requirements, dome-loaded regulators may be controlled by any of the preceding regulators described or they may receive pressure from other sources.

The pneumatic distribution system uses many regulators in a dome-loading, dome-loaded combination. (See example.) The dome-loaded regulators, which reduce the pressure of the medium flowing through them, will be referred to as primary regulators. The dome-loading regulators, which are low flow regulators that reduce the pressure applied to the domes of primary regulators, will be referred to as reference pressure regulators. The reference pressure regulator may be either a manually adjusted regulator, a preset regulator, or a remotely adjusted regulator.



TYPICAL DOME-LOADING,
DOME-LOADED REGULATOR COMBINATION

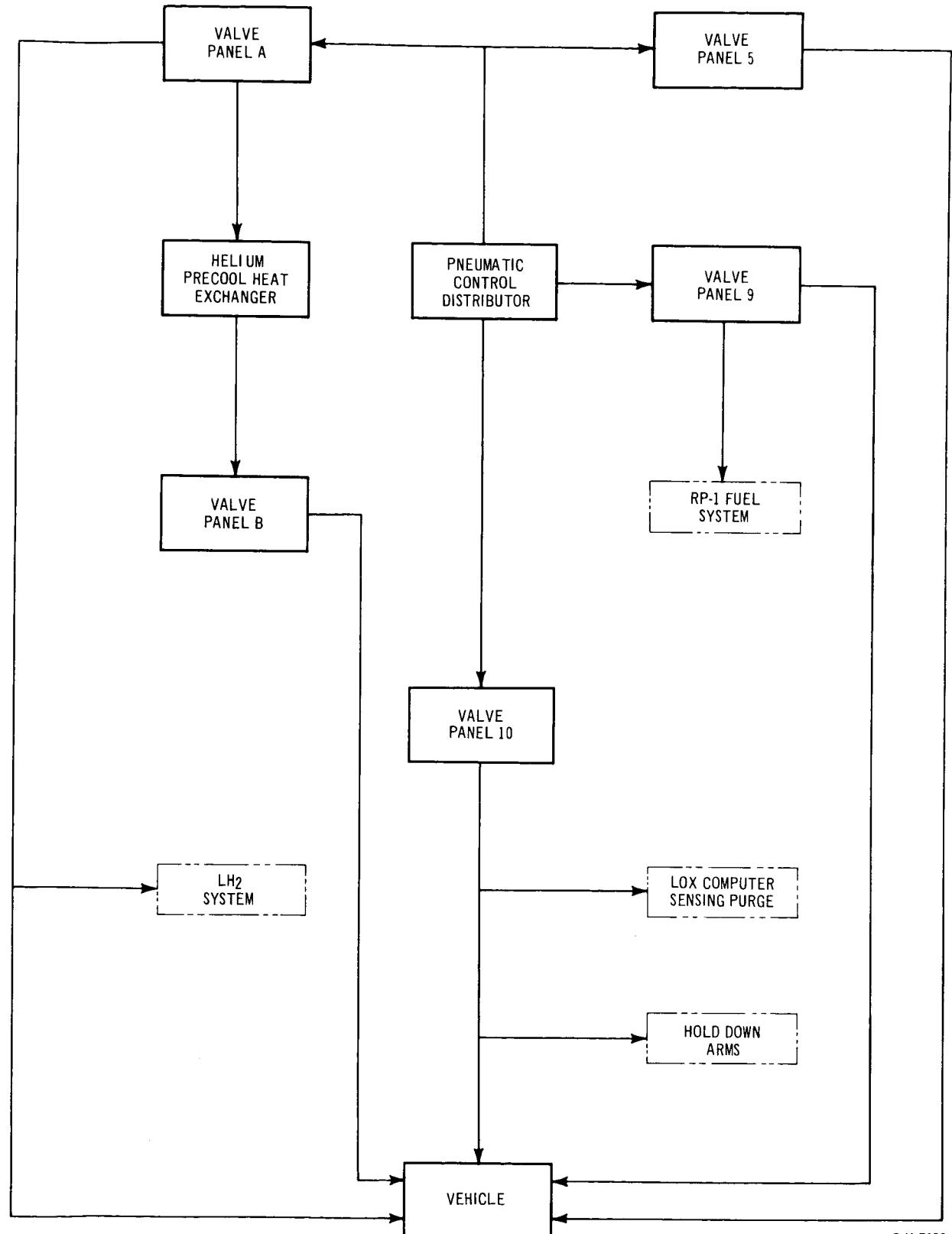


FIGURE 2. HELIUM DISTRIBUTION BLOCK DIAGRAM

C-H 7029

A 3000-750 psig designation preceding the regulator nomenclature indicates that the regulator reduces the medium from 3000 psig at the inlet to 750 psig at the outlet.

Pressure monitoring components are used in various combinations with the regulators. The most common are a pressure gage and a pressure switch or a pressure gage and a pressure transducer.

Electrical feedback signals from valves, and signals from pressure-operated switches and liquid level sensors, illuminate nomenclated, bar-type indicating lights on the panels. Dial-pointer indicators on the panels display information from pressure and temperature transducers. To differentiate the dial-pointer indicators from the bar-type indicating lights, the dial-pointer-type are referred to as indicators and the bar-type as indicating lights.

The mechanical schematics beginning on page 97 represent the ground and vehicle pneumatic distribution systems and should be used, in conjunction with the text, to follow the various flow routes of the system operation.

2. PNEUMATIC CONTROL DISTRIBUTOR

The PCD consists of a GN₂ section and a helium section. Inlet lines, shutoff valves, filters, primary regulators, and supply valves for each section are in the basement of the AGCS, and a control panel for each section is on the first floor of the AGCS. The GN₂ section includes three parallel systems: test and launch GN₂ system No. 1, launch GN₂ system No. 2, and launch GN₂ system No. 3. Each of these systems receives 6000-psig GN₂ from the storage facility, reduces it to 3000 psig, and supplies the 3000-psig GN₂ to a common manifold. Valve panels 5, 9, 10, and the deluge purge panel receive 3000-psig GN₂ from the manifold. The helium section includes two systems: test and launch helium system No. 1, and launch helium system NO. 2. The two helium systems also reduce 6000 psig to 3000 psig and supply the helium to a single helium manifold. The manifold distributes 3000-psig helium to valve panels 5, 9, and 10. Both the GN₂ and helium sections of the PCD have pressure switches, pressure transducers, solenoid valves, and position indicators for monitoring and controlling PCD operation. The PCD also distributes 6000-psig GN₂ to valve panel B and 6000-psig helium to valve panel A. This high pressure gas is routed directly to the valve panels from the PCD inlet lines (to valve panel B from launch GN₂ system No. 3 and to valve panel A from launch helium system No. 2). Although the PCD output is maintained at 1500 psig for checkout and for part of countdown, only the 3000 psig operation is described. The pressure is increased to 3000 psig by manually adjusting Reference Pressure Regulators A1467, A1491, A1602, and A1626 at approximately T -50 minutes.

2.1. GN₂ Section Operation (figure 4)

The three GN₂ systems receive 6000-psig GN₂ through separate supply lines from the nitrogen and helium storage facility. GN₂ entering test and launch GN₂ system No. 1 flows through 10-micron Filter A1453 to 6000-3000 psig Reference Pressure Regulator A1467 and 6000-3000 psig Primary Regulators A1457 and A1458. 3000-psig GN₂ from the reference pressure regulator flows through Solenoid Valve A1463 and dome-loads the primary regulators. GN₂ flowing from 6000-3000 psig Primary Regulators A1457 and A1458 enters 3000-psig GN₂ Distributor Manifold A1577.

GN₂ entering launch GN₂ systems Nos. 2 and 3 flows through 10-micron Filters A1477 and A1498, to 6000-3000 psig Reference Pressure Regulator A1491, and to 6000-3000 psig Primary Regulators A1481, A1482, A1505, and A1506. 6000-psig GN₂ from launch GN₂ system No. 3 flows through a supply line to valve panel B located on the umbilical tower. 3000-psig GN₂ from the reference pressure regulator flows through Solenoid Valve A1487 and dome-loads the primary regulators. From 6000-3000 psig Primary Regulators A1481, A1482, A1505, and A1506, GN₂ flows into 3000-psig GN₂ Distributor Manifold A1577. (GN₂ can be supplied to the reference pressure regulators from one or all three GN₂ systems depending on the positions of Manual Valves A1471, A1492, and A1500.) Valve panels 5, 9, 10, and the deluge purge panel receive 3000-psig GN₂ through a series of supply lines from Distributor Manifold A1577.

6000-psig Manual Supply Valves A1452, A1476, and A1497, and 3000-psig Manual Supply Valves A1459, A1483, and A1507 provide signals to 'open' and 'closed' position indicating lights on the PCD control panel in the AGCS and on the ground pressures panel in the LCC. Pressure Transducers A1469 and A1524 provide signals to the 'GN₂ 6000 psi supply' and 'GN₂ 3000 psi supply' indicators on the ground pressures panel.

Each supply line from 3000-psig GN₂ Distributor Manifold A1577 contains a pressure switch that provides a signal to its indicating light on the PCD control panel when that line has been pressurized to 15 psig or greater.

If an emergency arises, Solenoid Valves A1463 and A1487 are energized to the closed (vent) position by 'GN₂ No. 1' and 'GN₂ Nos. 2 & 3' emergency cutoff switches on the ground pressures panel in the LCC. GN₂ vents from the domes of the primary regulators to atmosphere through the solenoid valves and Silencers A1462 and A1486. The primary regulators then close and shut off GN₂ flow from the distributor manifold.

2.2. Helium Section Operation

The helium section receives 6000-psig helium through two supply lines from the nitrogen and helium storage facility. Helium entering test and launch helium system No. 1 and launch helium system No. 2 flows through 10-micron Filters A1588 and A1612 to 6000-3000 psig Reference Pressure Regulators A1602 and A1626 and to 6000-3000 psig Primary Regulators A1592, A1593,

A1616, and A1617. 6000-psig helium from launch helium system No. 2 also flows through a supply line to valve panel A on the umbilical tower. 3000-psig helium from the reference pressure regulators flows through Solenoid Valves A1598 and A1622 and dome-loads the primary regulators. From 6000-3000 psig Primary Regulators A1592, A1593, A1616, and A1617, helium flows into Helium Distributor Manifold A1635. A series of supply lines from the manifold distributes the 3000-psig helium to valve panels 5, 9, and 10.

6000-psig Manual Supply Valves A1587 and A1611 and 3000-psig Manual Supply Valves A1594 and A1618 provide signals to 'open' and 'closed' indicating lights on the PCD control panel in the AGCS and to the ground pressures panel in the LCC. Pressure Transducers A1604 and A1640 provide signals to the 'helium 6000 psi supply' and 'helium 3000 psi supply' indicators on the ground pressures panel. When a supply line from 3000-psig Helium Distributor Manifold A1635 is pressurized to 15 psig or greater, a pressure switch on that line provides a signal to an indicating light on the PCD control panel.

If an emergency arises, the output pressure from the PCD helium distributor manifold can be shut off by energizing Solenoid Valves A1598 and A1622 to the closed (vent) position. The emergency cutoff switches ('helium No. 1' and 'helium No. 2') that energize these solenoid valves are located on the ground pressures panel in the LCC. Helium from the domes of the primary regulators vents to atmosphere through the solenoid valves and Silencers A1597 and A1621, allowing the primary regulators to close.

3. VALVE PANEL 5

Valve panel 5, located on the first floor of the AGCS, receives 3000-psig GN₂ and helium from the nearby PCD control panels. The valve panel supplies GN₂ at 3000, 750, 50, and 25 psig; and helium at 3000 psig. A 3000-psig manifold distributes GN₂ directly to the swing arm accumulators pneumatic systems and the air bearing system and through regulators to the tower purge and launcher purge systems. A 750-psig manifold supplies GN₂ for umbilical release, for fuel booster line valve control, and to the tower manifold supply line; and through a regulator to the fuel-adjust level regulator supply system. The helium system supplies 3000-psig helium to the vehicle S-I stage for the propellant slosh measurement system.

3.1. 3000-psig GN₂ System Operation (figure 5)

3000-psig GN₂ enters valve panel 5 and flows through 5-micron Filter A2052 to Manifold A2054, which supplies the GN₂ to various areas.

3.1.1. Tower Purge System. 3000-psig GN₂ from the manifold enters the tower purge system and flows to 3000-50 psig Reference Pressure Regulator

A2056 and 3000-50 psig Primary Regulator A2057. 50-psig GN₂ from the primary regulator then flows to the umbilical tower for purging electrical panels and components, thus minimizing fire hazards. The environmental control system also receives 50-psig GN₂ from the tower purge system for pneumatic valve actuation (described in Volume VI). Pressure Switch A2061 provides an electrical signal to a 'tower purge pressure' indicating light on the ground pressures panel. The signal is also one of the prerequisites for a 'facility purge OK' indication on the firing panel in the LCC.

3.1.2. Launcher Purge System. The launcher purge system receives 3000-psig GN₂ from the manifold and reduces it to 50 psig for purging electrical panels in the launcher and housings on short cable masts Nos. 2 and 4. 3000-50 psig Reference Pressure Regulator A2120 and 3000-50 psig Primary Regulator A2121 effect the pressure reduction. Pressure Switch A2125 located downstream from Primary Regulator A2121 provides an electrical signal to the 'launcher purge pressure' indicating light on the LCC ground pressures panel. When both the launcher purge and the tower purge pressure switches have been actuated, a 'facility purge OK' indicating light on the LCC firing panel illuminates.

50-psig GN₂ flows to housings of short cable masts Nos. 2 and 4 and enters through Orifices A6506 and A6606. The GN₂, reduced to a slightly positive pressure by the orifices, provides an inert atmosphere and prevents contaminants from entering the housings (Volume VII).

3.1.3. Swing Arm Accumulator GN₂ Supply. 3000-psig GN₂ Manifold A2054 supplies GN₂ through Manual Valve A2066 directly to swing arms Nos. 1, 2, and 3 pneumatic systems for charging the accumulators. The necessary control components in this system are described in Volume VII.

3.1.4. Air Bearing GN₂ Supply System. Valve panel 5 supplies 3000-psig GN₂ to the air bearing control system, which supplies GN₂ to the ST 124 in the vehicle instrument unit (IU). GN₂ from 3000-psig GN₂ Manifold A2054 flows to a desiccant panel mounted on the AGCS wall behind valve panel 5. Upon entering the desiccant panel, GN₂ flows into Filter A2080, which removes water and solid matter from the GN₂. From the filter, GN₂ flows through Purifiers A2103, A2102, and A2081, which provide additional filtration by removing any remaining oil or water vapor. The GN₂ re-enters valve panel 5 and flows through 3-micron Filter A2071 to Solenoid Valve A2083, which is energized (opened) by the 'platform GN₂ supply' switch on the IU nitrogen control panel. The solenoid valve is deenergized (closed) at lift-off. GN₂ flow continues past Pressure Switch A2075, which actuates at 15 psig and starts Elapsed Time Meter A2076, and enters the vehicle through an umbilical coupling on swing arm No. 2. As GN₂ enters the vehicle system, it flows through Filter G501 to high pressure Sphere G503. The air bearing GN₂ system receives 3000-psig GN₂ from the ground system until liftoff; then the high pressure sphere assumes the GN₂ supply to the ST 124. GN₂ flows into Regulator-Heater Assembly G507. This assembly contains a filter, a preset pressure regulator, a normally open solenoid valve with a bypass orifice, and a heater. After the GN₂ has been reduced in pressure and heated if necessary, it flows through Filter G510 before entering the ST 124.

Pressure Switch G505 provides an electrical signal to '3000 psig GN₂ ST 124' indicating light on the IU nitrogen control panel. Actuation of the pressure switch is a prerequisite for the 'flight control system OK' signal. When supply pressure is above 1200 psig, Pressure Switch G506 provides a signal to the '1200 psig GN₂ ST 124' indicating light on the IU nitrogen control panel. If the supply pressure should drop below the minimum limits during standby operation, Pressure Switch G506 will deactivate. The '1200 psig GN₂ ST 124' indicating light will go out, the solenoid valve in Regulator-Heater Assembly G507 will be energized (closed), and power will be removed from the ST 124. After the solenoid valve in the regulator-heater assembly has closed, GN₂ will flow through the bypass orifice at a reduced flowrate to allow safe bearing runout as the gyro speed decays.

GN₂ to the ST 124 is maintained at a temperature of 25 $\pm 1^{\circ}\text{C}$ by Thermostat G509 and the heater in Regulator-Heater Assembly G507. The thermostat, located downstream from the regulator heater assembly, monitors the GN₂ temperature and switches the heater on and off as required. Temperature Transducers G514 and G515 monitor the regulator-heater assembly GN₂ input and output temperatures for telemetering to the LCC. Pressure Transducers G511 and G517 monitor the inlet and outlet pressure of Regulator-Heater Assembly G507 for telemetering to the LCC.

3.2. 750-psig GN₂ System Operation

GN₂ from 3000-psig GN₂ Manifold A2054 flows to Reference Pressure Regulator A2090 and Primary Regulator A2091, which reduce the pressure to 750 psig. 750-psig GN₂ Manifold A2092 receives the GN₂ from the primary regulator and serves as a distribution point for the system.

When Manifold A2092 is pressurized, Pressure Switch A2096 provides an electrical signal to 'valve panel 5 750 psi' indicating light on the ground pressures panel. A signal, initiated by the pressure switch, illuminates the 'launcher 750 psi' indicating light on the RP-1 control panel.

3.2.1. Adjust Level Regulator System. GN₂ from the 750-psig manifold flows into manually adjusted Pressure Regulator A2109, which reduces the pressure to 25 psig. The GN₂ flows through Pressure Controller A559 to operate the adjust-level regulator (described in Volume I), and flows to the LOX replenish system for valve control (described in Volume II).

Pressure Switch A2113 initiates a signal to the 'computer 25 psi' indicating light on the RP-1 control panel.

3.2.2. Tower Manifold Supply System. The tower manifold supply line, originating at Manifold A2092 in valve panel 5, provides 750-psig GN₂ at each level of the umbilical tower for use when additional pressure is needed. The engine compartment conditioning system receives 750-psig GN₂ from the tower manifold supply line for valve actuation (described in Volume VI). Manual Valve A2162 provides system isolation when additional lines are connected to the tower manifold supply line.

3.2.3. Umbilical Release Supply System. 750-psig GN₂ from Manifold A2092 flows through Manual Valve A2130 to swing arms Nos. 1, 2, and 3 (Volume VII). The same line also supplies 750-psig GN₂ to the LOX and LH₂ systems for valve actuation (described in Volumes II and III), and to the Q-Ball cover removal system pneumatic panel (described in paragraph 9.3).

3.2.4. Fuel Booster Line Valve Control System. Fuel Booster Line Valve A519 (Volume I) opening and closing pressure is controlled by two solenoid valves that are electrically controlled from the LCC and operate simultaneously. When the solenoid valves are deenergized, 750-psig GN₂ flows through Solenoid Valve A2135 into the closing actuator of Fuel Booster Line Valve A519 to maintain the valve closed. Pressure in the booster-line valve-opening actuator vents to atmosphere through Solenoid Valve A2138 and Manual Vent Valve A2139. When the solenoid valves are energized, either manually by the 'booster line valve' switch on the RP-1 control panel or automatically by electrical circuitry during RP-1 system operations, Solenoid Valve A2138 opens and Solenoid Valve A2135 closes. 750-psig GN₂ flows through Solenoid Valve A2138 into the opening actuator on the booster line valve. The closing actuator pressure vents to atmosphere through Solenoid Valve A2135 and Check Valve A2136, allowing Fuel Booster Line Valve A519 to open. Manual Vent Valve A2139 can be closed to prevent the booster-line valve from closing when Solenoid Valve A2138 is deenergized (closed) or, the manual vent valve can be adjusted to effect slow closing of the booster-line valve when Solenoid Valve A2138 de-energizes.

3.3. Helium System Operation (figure 5)

The valve panel 5 helium system receives 3000-psig helium from the PCD. Helium enters the valve panel and flows through 5-micron Filter A2144 to Solenoid Valve A2146 and Manual Bypass Valve A2147. Normal helium flow is through the solenoid valve, which is energized (opened) from the vehicle pressure panel by the 'pressurize helium spheres' switch. 3000-psig helium then flows into the S-I stage through Couplings A3048 and B400 (figure 9). After entering the S-I stage, the helium flows through 20-micron Filter B401 and into Helium Bottle B405, which supplies helium for the inflight slosh probe purge. Pressure Switch B403 actuates when the helium bottle has been pressurized to 3000 psig, providing an electrical signal to 'helium 3000 psig OK' indicating light on the vehicle pressures panel. Ground pressure is supplied to the system until the 'time for ignition' signal causes Solenoid Valve A2146 in valve panel 5 to close.

3.3.1. Pre-Flight Slosh Probe Purge System Operation. The pre-flight slosh probe purge operation begins at the initiation of firing command. Solenoid Valves B408 and B415 open and permit helium flow through Orifices B420, which reduce the flowrate to 30 scfh and the pressure to approximately 850 psig. Helium then enters the slosh probes in Fuel Container F-4 and LOX Containers O-C and O-2 through Orifices B416, which further reduce the pressure to 450 psig. Pre-flight slosh probe purge continues until H-1 engine ignition.

3.3.2. Slosh Probe Inflight Helium Supply Operation. During flight, helium from Bottle B405 flows through 3000-450 psig Pressure Regulators B406 and B417 and Orifices B416 into the slosh probes in Fuel Container F-4 and LOX Containers O-C and O-2. The helium pressure in the probes during flight provides a reference pressure for slosh measurement and prevents the propellants from filling the probes.

3.3.3. Slosh Probe Operation. During flight, slosh in Fuel Container F-4 and LOX Containers O-C and O-2 is measured by Differential Pressure Transducers B413, B414, B411, B412, B409, and B410. The two differential pressure transducers mounted on each container measure the pressure differential caused by wave movement (upward on one probe and downward on the other) across diametrically opposite pairs of probes. The measurements are telemetered to the LCC.

4. VALVE PANEL 9

Valve panel 9, located on the 108-foot level of the umbilical tower, contains a GN₂ system and a helium system supplied with 3000-psig GN₂ and helium from the PCD control panels and with 50-psig GN₂ from the tower purge system. The GN₂ system supplies 3000 psig to the fuel containers pressurization spheres in the S-I stage, 750 psig control pressure to the S-I stage fuel vent valves, and 750 psig to the LOX system for valve control. The helium system regulates and supplies helium pressure to purge the RP-1 fuel system computer sensing lines. Solenoid valves in valve panel 9 provide remote operation capabilities from the LCC. The manual operations required from valve panel 9 are: initial adjustment of the pressure regulators; opening the manual supply valves; and, when operations have been completed, manually venting the systems.

To reduce fire hazards, valve panel 9 receives a constant cabinet purge from the tower purge system. GN₂, reduced from 50 psig to a slightly positive pressure by Orifice A5078, purges and 'inerts' the cabinet atmosphere. Calibrated Bleed A5079 helps maintain the positive pressure in the cabinet by restricting the GN₂ flow to atmosphere.

4.1. GN₂ System Operation

3000-psig GN₂ entering valve panel 9 flows through 5-micron Filter A5002 to Solenoid Valve A5010 in the fuel containers pressurization spheres supply line, and to Reference Pressure Regulator A5019 and Primary Regulator A5018 in fuel containers vent valves 750-psig GN₂ supply line.

4.1.1. Fuel Containers Pressurization Sphere Supply. The fuel containers pressurization spheres are pressurized with GN₂ to 1500 psig at T -1 day from valve panel 9. The pressure, maintained at 1500 psig until approximately T -50 minutes, is then increased to 3000 psig by the PCD (described in paragraph 2.). As before, only the 3000 psig operation is described.

Solenoid Valve A5010, energized (opened) by the fuel system supply 'pressurize-vent' switch on the vehicle pressure panel, permits 3000-psig GN₂ to flow into the S-I stage (figure 9), through Filter B251 and Check Valve B252, and into fuel containers pressurization Spheres B253. When the spheres have been pressurized to 3000 psig, Pressure Switch B258 causes the 'fuel pressure 3000 psig OK' indicating light on the vehicle pressure panel to illuminate. The feedback from the pressure switch is also a prerequisite for S-I stage ignition. Solenoid Valve A5010 remains energized (opened) until 'time for ignition' command is initiated at T -0 seconds. To ensure a low pressure condition in the pressurization line for disconnect from the ground system at liftoff, Solenoid Vent Valve A5009 energizes (opens) at 'ignition' command and vents the line. GN₂ flow through Filters B254 into the fuel containers is controlled by Solenoid Valves B255 (described in Volume I).

3000-psig GN₂ from Filter B251 also flows through Check Valve B231 into LOX-SOX vaporization triplex Spheres B198, B199, and B232. The LOX-SOX vaporization system supplies GN₂ into the S-IV boattail area during chilldown of the RL10A-3 engines to reduce fire hazards. During flight, Solenoid Valves B233 and B234 isolate the triplex spheres from the LOX-SOX vaporization control system until 70 seconds have elapsed. Solenoid Valves B233 and B234 are then opened by a signal from the guidance computer through the flight sequencer to allow pressure equalization between the triplex spheres, the fuel containers pressurization spheres, and Manifold B235. (After 70 seconds of flight when fuel container pressurization and vehicle acceleration are sufficient to meet the fuel inlet requirements of the H-1 engine fuel pumps, the residual GN₂ in fuel containers pressurization Spheres B253 is then supplied to the LOX-SOX vaporization system.) Solenoid Valves B236, B237, B238, B239, B240, B241, and B242 open during the RL10A-3 engine prestart operation (described in Volume X). GN₂ flows through the solenoid valves into Plenum Chamber B243, which supplies the GN₂ through six disposal manifolds located directly below the RL10A-3 engine nozzles. The GN₂ flowing into the S-IV boattail from the manifolds reduces S-IV stage fire hazards during engine start by diluting and dispersing LOX and SOX present in the nozzles.

4.1.2. 750-psig GN₂ Control Pressure Supply (figure 5). 3000-psig GN₂ flows into 3000-750 psig Reference Pressure Regulator A5019 and 3000-750 psig Primary Regulator A5018. 750-psig GN₂ from the primary regulator flows to fuel containers vent valves opening control Solenoid Valve A5023. The solenoid valve opens when the function selector switch on the networks panel is in the 'pre-launch' or 'launch' position and closes at fire command. GN₂ from Solenoid Valve A5023 flows into the S-I stage and opens Fuel Container Vent Valves B106 (described in Volume I).

The 750-psig GN₂ control pressure system also supplies GN₂ to the S-IV main LOX fill and replenish control system for valve actuation (described in Volume II).

4.2. Helium System Operation (figure 5)

3000-psig helium entering valve panel 9 flows through Filter A5048 to 3000-450 psig Pressure Regulator A5050. From the regulator, 450-psig helium

flows into the high and low pressure fuel computer sensing lines purge system. During fuel tanking operations, helium purges the computer sensing lines in Fuel Container F-4 and prevents fuel from rising into the lines as the containers are filled.

4.2.1. Fuel Density and Tanking Computer Sensing Line Purge. 450-psig helium from Pressure Regulator A5050 flows through Orifice A5061, which further reduces the pressure to 150 psig. Pressure Switch A5063 actuates at 50 psig and provides a 'helium OK' signal to the fuel tanking computer. The 150-psig helium flows through Orifice A5064 for a final reduction in pressure to approximately 16 psig before entering the high pressure sensing line that connects the lower sensing line in Fuel Container F-4 to the fuel tanking and density computers (described in Volume I). Solenoid Valve A5066, located downstream from Orifice A5064 on the sensing line to the computers, energizes (closes) at fuel container pressurizing command to prevent pressurization of the computers.

4.2.2. Fuel Density Computer Sensing Line Purge. Orifice A5053 reduces the 450-psig helium to 150 psig. Pressure Switch A5055 actuates at 50 psig and supplies a 'helium OK' signal to the fuel density computer. The 150-psig helium flows through Orifice A5056 for a final pressure reduction to approximately 16 psig before entering the low pressure sensing line that connects an upper sensing line in Fuel Container F-4 to the fuel density computer (described in Volume I). Solenoid Valve A5058 energizes (closes) at fuel container pressurize command to prevent fuel density computer pressurization.

4.2.3. Fuel Tanking Computer Sensing Line. The low pressure sensing line from the top of Fuel Container F-4 is routed through valve panel 9 to the fuel tanking computer (Volume I). Solenoid Valve A5070, in valve panel 9, energizes (closes) at fuel container pressurization command to prevent computer pressurization. The low pressure sensing line, which senses only the ullage pressure, does not receive a helium purge from valve panel 9.

Solenoid Valves A5066, A5058, and A5070 remain energized until approximately 300 seconds after the commit signal and are then deenergized (opened) by a timer.

5. VALVE PANEL 10

Valve panel 10, on the first floor of the AGCS, consists of GN₂ and helium sections that receive 3000-psig supply pressure from the PCD. Each section effects distribution of required GN₂ and helium pressures to various ground and vehicle systems.

5.1. GN₂ Section Operation (figure 6)

The GN₂ section distributes the GN₂ to various purge and bubbling systems, pneumatic control equipment, and the 750-psig GN₂ launcher manifold.

3000-psig GN_2 from the PCD flows into valve panel 10 through 5-micron Filters A5152 and A5153 and pressurizes Manifold A5157, which distributes 3000-psig GN_2 to various systems.

5.1.1. LOX Dome Trickle Purge and LOX Dome High-Flow-Rate Purge. The LOX dome trickle purge is initiated when the thrust chamber covers are removed from the H-1 engines and continues until just prior to engine ignition. 3000-psig GN_2 from Manifold A5157 flows into 3000-240 psig Reference Pressure Regulator A5220, 3000-165 psig Primary Regulator A5232, and 3000-240 psig Primary Regulator A5223. (The design of Primary Regulator A5232 provides an output pressure of 165 psig when the regulator is dome-loaded with 240 psig.) Solenoid Valve A5222 prevents dome-loading of Primary Regulator A5223 during LOX dome trickle purge operation. 165-psig GN_2 flows through Solenoid Valve A5234, which is energized (opened) by the 'LOX dome by-pass purge' switch on the firing preparation panel. A feedback signal from the solenoid valve illuminates the 'LOX dome bypass open' indicating light on the same panel. From Solenoid Valve A5234, GN_2 flows out of valve panel 10 into the S-I stage to the LOX domes of the H-1 engines (described in Volume VIII).

At T -25 seconds, the LOX dome high-flow-rate purge is initiated when the launch sequencer energizes (opens) Solenoid Valve A5222. Orifice A5221 prevents a pressure surge to the dome of 3000-240 psig Primary Regulator A5223 when the solenoid valve opens. 240-psig GN_2 from the primary regulator flows to the H-1 engines LOX domes at a higher flowrate because of larger plumbing used in the LOX dome high-flow-rate purge supply system. The purge continues until LOX pump outlet pressure overcomes the purge pressure and closes Check Valve B45 (Volume III). Pressure Switch A5227 actuates at approximately 195 psig. An electrical signal from the switch illuminates a 'LOX dome purge pressure' indicating light on the firing preparation panel and a 'LOX dome purge on' indicating light on the firing panel. Solenoid Valve A5221 deenergizes (closes) when the commit signal is initiated.

5.1.2. Thrust Chamber Fuel Injector Purge System Supply. 3000-psig GN_2 from Manifold A5157 flows to 3000-550 psig Reference Pressure Regulator A5196 and 3000-550 psig Primary Regulator A5199. GN_2 from the reference pressure regulator flows through Solenoid Valve A5198, which is energized (opened) at T -25 seconds by the launch sequencer, and dome-loads the primary regulator. GN_2 from Primary Regulator A5199 flows from valve panel 10 to the thrust chamber (TC) fuel injector in the S-I stage (described in Volume VIII). Pressure Switch A5203 provides an electrical signal to the 'TC fuel injector purge on' indicating light on the firing preparation panel and to the 'TC fuel injector purge pressure' indicating light on the firing panel. Solenoid Valve A5198 deenergizes at ignition command and Vent Solenoid Valve A5154 opens to vent the dome of Primary Regulator A5199. Solenoid Valves A6085 and A6086 open thrust-chamber fuel-injector purge-line Vent Valve A6084 to vent the GN_2 purge pressure, preventing possible damage to the engines from cold GN_2 entering the hot fuel injector if launch is aborted after engine ignition.

5.1.3. Gas Generator LOX Injector Purge System Supply. 3000-psig GN_2 from the GN_2 manifold flows to 3000-300 psig Reference Pressure Regulator A5208 and 3000-300 psig Primary Regulator A5211. Solenoid Valve A5210, energized

(opened) at T -25 seconds by the launch sequencer, permits GN₂ from the reference pressure regulator to dome-load the primary regulator. GN₂ from Primary Regulator A5211 flows into the S-I stage to the gas generator (GG) (described in Volume VIII). Pressure Switch A5215 actuates and provides an electrical signal to the 'GG LOX injector purge pressure' indicating light on the firing preparation panel and to the 'GG LOX injector purge on' indicating light on the firing panel. Solenoid Valve A5210 deenergizes when the commit signal is initiated by the launch sequencer.

5.1.4. RP-1 Fuel Bubbling System Supply. Reference Pressure Regulator A5185 and Primary Regulator A5186 reduce 3000-psig GN₂ from Manifold A5157 to 290 psig. GN₂ from the primary regulator flows to Solenoid Valve A5194. Two prerequisites are necessary before fuel bubbling can be initiated: Pressure Switch A5191 must be actuated and Fuel Container Vent Valves B106 must be open. When these conditions have been met, Solenoid Valve A5194 can be energized (opened) by the 'fuel bubbling' switch on the firing panel. The 'RP-1 bubbling' indicating light on the RP-1 control panel illuminates when the solenoid valve opens. GN₂ flows into the S-I stage and enters the fuel suction lines (described in Volume I). GN₂ bubbling through the RP-1 in the fuel suction lines is initiated when LOX loading begins and continues, except for a brief period during the adjust-level drain operation of the fuel system, until the fuel container pressurization command at T -150 seconds closes Solenoid Valve A5194.

5.1.5. S-I Control Pressure System Supply. Prior to propellant loading, the control pressure spheres in the S-I stage are pressurized with GN₂. The control pressure spheres 'pressurize-vent' switch on the vehicle pressure panel energizes Solenoid Valve A5158 in valve panel 10. GN₂ from 3000-psig GN₂ Manifold A5157 flows through Orifice A6628 into the S-I stage (figure 8). GN₂ flow continues through 25-micron Filter B201 to control pressure Spheres B205 and B206. Pressure Switch B203 supplies an electrical signal to the 'control pressure 3000 psig' indicating light on the firing panel and to the 'control 3000 psig OK' indicating light on the vehicle pressure panel. The signal is also one of the prerequisites for 'preparations complete.' Solenoid Valve A5158 remains energized until 'time for ignition' to ensure maximum sphere pressure at liftoff. If it becomes necessary, Spheres B205 and B206 can be vented by placing the control pressure spheres 'pressurize-vent' switch in the vent position, which energizes Solenoid Vent Valve B207; however, these spheres cannot be vented after the firing command has been initiated.

5.1.6. S-I Control Pressure System Operation. GN₂ from control pressure Spheres B205 and B206 flows through 25-micron Filter B208 and 3000-750 psig Pressure Regulator B209 to Manifold B211. Pressure Switch B213 provides an electrical signal that illuminates the 'control pressure 750 psig' indicating light located on the firing panel and the 'control 750 psig OK' indicating light on the vehicle pressure panel. This signal is also a prerequisite for 'preparation complete.'

Manifold B211 supplies 750-psig GN₂ to Solenoid Valves B215, B216, and B222, which control LOX system components (described in Volume II); to Solenoid Valves B217, which control Prevalves B103 and B155 (whose operations are described in Volumes I and II); through Manual Valve B214 to the H-1 engine

gearbox pressurization ring manifold and LOX pump seal purge systems (described in Volume VIII); and to Solenoid Valve B220 in the calorimeter purge system.

The calorimeter purge prevents combustion products and other foreign matter from collecting on the calorimeter windows during H-1 engine operation. Solenoid Valve B220 energizes at power transfer, allowing GN₂ flow through Orifices B219 to Calorimeters B221. The orifices, which restrict the flowrate to 30 +0.3 scfm and protect the calorimeters from pressure surges, will also prevent depletion of the control pressure system if a calorimeter is lost during flight. The purge system operates throughout S-I stage flight and terminates at approximately the same time as outboard engine cutoff.

5.1.7. GN₂ Transfer to the Launcher Manifold (figure 6). GN₂ from Manifold A5157 flows to 3000-750 psig Reference Pressure Regulator A5166 and 3000-750 psig Primary Regulator A5167. From the primary regulator, 750-psig GN₂ flows to the launcher manifold. Pressure Switch A5174 supplies electrical power to the 'valve panel 10 750 psi' indicating light on the ground pressure panel. Launcher manifold Pressure Switch A5181 supplies an electrical signal to the 'launcher manifold pressure' indicating light also located on the ground pressure panel. This signal, plus a signal from the holdown arms 750-psig system, illuminates a firing panel 'ground pressure 750 OK' indicating light.

5.1.8. Launcher Manifold Distribution. From the launcher manifold, 750-psig GN₂ flows through:

- a. Solenoid Valve A5600 (Volume I) to the fuel filling mast.
- b. Solenoid Valve A5617 (Volume I) to Fuel Fill and Drain Valve B111.
- c. Solenoid Valve A5616 (Volume II) to LOX Fill and Drain Valve B152.
- d. Solenoid Valve A5618 (Volume II) to LOX Replenish Valve B151.
- e. Solenoid Valve A2762 (Volume II) to the main LOX storage system.
- f. Solenoid Valve A5601 (Volume VII) to the fuel mast release panel.
- g. Solenoid Valve A5602 (Volume VII) to Release Short Cable Mast No. 2.
- h. Solenoid Valve A5604 (Volume VII) to the LOX fill mast release panel.
- i. Solenoid Valve A5605 (Volume VII) to release short cable mast No. 4.
- j. Solenoid Valves A6084 and A6085 (Volume V) to actuate TC fuel injector purge Vent Valve A6084.

The launcher manifold also supplies 750-psig GN₂ actuation pressure to Electropneumatic Valve A4901 (Volume VI) in the S-I engine compartment conditioning system.

5.2. Helium Section Operation (figure 6)

Two supply lines transfer 3000-psig helium from the PCD to the helium section of valve panel 10. After necessary pressure reductions, the helium system effects distribution to the LOX system and to the holdown arms release panel. From the GN₂ section of valve panel 10, a crossover line supplies 3000-psig GN₂ to the helium section for checkout purposes.

Helium enters the valve panel through 5-micron Filters A5237 and A5238 and flows into a line that supplies the helium to the LOX system and holdown arms release panel.

5.2.1. LOX Containers Pressurization Supply System. 3000-psig helium flows through Manual Valve A5242 to Solenoid Valves A6028 and A6029 in the LOX system, which control pressurization of the LOX containers (described in Volume II). Pressure Switch A5291 provides an electrical signal to the 'LOX tank supply open' indicating light on valve panel 10 when the LOX container pressurization line has been pressurized to 15 psig or greater.

5.2.2. LOX Computer Sensing Line Purge. Helium from the inlet lines flows through 3000-450 psig Pressure Regulator A5280 and Orifice A6070 to the LOX computer sensing line that connects the LOX computer to the bottom of LOX Container O-C (described in Volume II).

5.2.3. LOX Bubbling Supply System. Helium flows to 3000-315 psig Reference Pressure Regulator A5244 and 3000-315 psig Primary Regulator A5245. From the primary regulator, 315-psig helium flows through Solenoid Valve A5607 into the S-I stage for LOX bubbling in the H-1 engine suction lines (described in Volume II).

5.2.4. Holdown Arms Release Panel Helium Supply. 3000-psig helium is reduced by 3000-750 psig Reference Pressure Regulator A5271 and 3000-750 psig Primary Regulator A5270 and supplied to the holdown arms release panel for valve actuation (described in Volume VII).

5.2.5. Helium System Checkout. 3000-psig GN₂ from the valve panel 10 GN₂ section is used to check out the helium section systems and components. This operation conserves the helium supply for actual launch operations.

Manual Valves A5254, A5292, and A5242 admit GN₂ from Manifold A5157 into the main helium supply line. The helium section operates from the GN₂ supply as described in paragraphs 5.2.2., 5.2.3., and 5.2.4.

6. VALVE PANEL A

Valve panel A, located on the umbilical tower, receives 6000-psig helium from the PCD and 6000-psig GN₂ from valve panel B. The GN₂ is used only for checkout purposes to conserve helium for launch operations. Valve panel A

reduces the pressure and supplies helium to the LH₂ system, to the S-IV stage, and through the helium precool heat exchanger to valve panel B. At T -1 day, helium is supplied at 1500 psig to check the vehicle systems for pressure leaks. Prior to launch, the pressure is increased to 3000 psig and, as before, only that operation will be described.

Pressure transducers and temperature transducers provide electrical signals to Douglas Aircraft Company (DAC) control panels in the LCC. Pushbuttons on the control panels provide selection of conditions to be monitored by applying signals from the transducers to indicators that convert the electrical signals to 'psi' or '°F' displays.

Helium enters valve panel A and flows through Filter A2302 and Solenoid Valve A2312, which is energized by the '6000 helium' pushbutton switch on the pneumatic systems control panel. The same switch commands supply system vent Solenoid Valve A2314 to close. When Solenoid Valve A2312 opens and Solenoid Valve A2314 closes, they provide an electrical feedback, which illuminates a '6000 helium operating' indicating light. Input pressure to valve panel A is monitored remotely by electrical signals from Pressure Transducer A2304. Depressing the '6000 helium X 1000' switch on the pneumatic systems control panel applies the signals from the transducer to the pressure indicator.

Helium from Solenoid Valve A2312 flows to four 6000-3000 psig regulators. The 'control helium supply dome-loader valve' switch on the propulsion system preparation and control panel electrically controls the adjustment of 6000-3000 psig Reference Pressure Regulator A2344. Pressure Transducer A2347 provides remote monitoring of the reference pressure regulator output pressure. The 'dome pressure' pushbutton switch on the propulsion system preparation and control panel applies the transducer signal to the control helium system pressure indicator.

6.1. Control Helium Supply (figure 7)

3000-psig helium from 6000-3000 psig Primary Regulator A2349 flows through Solenoid Valve A2383, which is energized by the 'control supply valve' switch on the propulsion system preparation and control panel. When Solenoid Valve A2383 opens, a feedback signal illuminates the 'supply valve open' indicating light. Pressure Transducer A2378 supplies electrical signals through the 'regulator outlet pressure' pushbutton switch on the propulsion system preparation and control panel to the control helium system pressure indicator. Helium flows from the solenoid valve through 10-micron Filter A2384, over swing arm No. 2, and enters the S-IV stage, where it is distributed to the RL10A-3 fuel injector purge system through Check Valve E44 (described in Volume IX), the GH₂ vent stack purge system and triplex Spheres B422, the make-up pressurization system, and the control helium system.

6.1.1. RL10A-3 Engine GH₂ Vent Stack Purge. During countdown, the GH₂ vent stacks receive a helium trickle purge from the ground system to disperse any GH₂ or contaminants that may accumulate in the ducts. Helium flows through Check Valve E262 and Orifices E263 and E267 and is then distributed to the GH₂ vent stacks, which it enters through Orifices E268. Solenoid Valve E264 is

energized (closed) by the 'GH₂ vent stack' switch on the pneumatic system control panel and it remains closed until liftoff. The signal that closes Solenoid Valve E264 illuminates the 'GH₂ vent stack energized' indicating light. At liftoff, the solenoid valve opens to permit a higher flowrate of helium to purge the vent stacks during S-I stage operation. Triplex Spheres B422 supply the helium during flight.

6.1.2. Make-up Pressurization System. The make-up pressurization system provides additional helium for LH₂ container pressurization during flight. 3000-psig helium flows through Check Valve E217 to Make-up Pressurization Sphere E218. Pressure Switch E315 actuates at 2940 psig, supplying an electrical signal to the 'make-up sphere pressure normal' indicating light on the propulsion system preparation and control panel. If the LH₂ container requires make-up pressure to supplement the normal container pressurization system, Solenoid Valve E257 opens and Make-up Pressurization Sphere E218 supplies helium to the container (described in Volume III).

6.1.3. S-IV Stage Control Pressure System. The control pressure system supplies helium at a reduced pressure to solenoid control valves in the LOX, LH₂, and RL10A-3 engine systems. 3000-psig helium flows through Check Valve E201 into Control Pressure Sphere E202. From the sphere, helium flows through 10-micron Filter E205 and control helium supply Solenoid Valve E207 to 3000-475 psig Pressure Regulator E206. Helium from the regulator flows to LOX system components (described in Volume II), to LH₂ system components (described in Volume III), and to the RL10A-3 engine system components (described in Volume IX). When the control helium system is operating normally, Pressure Switches E208-2 and E220 will cause illumination of the 'control helium line pressure normal' indicating light on the propulsion system preparation and control panel. If the control pressure downstream of the regulator increases above 550 psig, Pressure Switches E208-1 and E208-2 will actuate. Pressure Switch E208-1 will close Solenoid Valve E207, and Pressure Switch E208-2 will remove power from the 'control helium line pressure normal' indicating light and apply power to the 'control helium line pressure high' indicating light. Solenoid Valve E207 can also be energized by manually positioning the 'control helium supply safety valve control' switch to the 'close' position. When the system pressure decreases to the prescribed level, the pressure switches will deactivate, allowing Solenoid Valve E207 to open and providing the proper indication on the control panel. Pressure Switch E220 provides a 'control helium line pressure low' indication if the control pressure decreases below 445 psig. Pressure Switch E219 actuates at 2965 psig and illuminates the 'control helium sphere pressure' indicating light on the propulsion system preparation and control panel. The 'control helium dump' switch energizes Solenoid Valve E203 when it becomes necessary to vent the system. The 'dump' signal also illuminates the 'control helium dump valve opened' indicating light.

6.2. 50-psig Helium Purge Supply (figure 7)

50-psig helium is supplied to the LH₂ system for purging various components during operation of that system. Helium from 6000-3000 psig Primary Regulator A2349 flows to 3000-500 psig Reference Pressure Regulator A2351 and Primary Regulator A2355. 500-psig helium from the primary regulator flows to

500-50 psig Reference Pressure Regulator A2360 and Primary Regulator A2364. Pressure Transducer A2357 supplies electrical signals through the 'primary regulator' pushbutton switch on the pneumatic systems control panel to the purge supply indicator. The 50 psig output from Primary Regulator A2364 is monitored by Pressure Transducer A2366. The 'secondary regulator' pushbutton switch on the pneumatic systems control panel applies the output signals from the transducer to the purge supply indicator. 50-psig helium flows through Solenoid Valves A2321 and A2371. The 'LH₂ nozzle purge' switch on the pneumatic system control panel energizes Solenoid Valve A2371. When the valve opens, a feedback signal illuminates the 'LH₂ nozzle purge valve open' indicating light and provides one of the prerequisites for the LH₂ loading system ready signal. Helium flows from Solenoid Valve A2371 through Orifice A2372 to purge the LH₂ nozzle (described in Volume III).

The 'LH₂ umbilical purge' switch on the propellant loading control and monitor panel energizes Solenoid Valve A2321 and supplies electrical power to the 'LH₂ system ready' indicating light on the stage system status panel. When the solenoid valve opens, the 'LH₂ umbilical purge closed' indicating light goes out and the 'LH₂ umbilical purge opened' indicating light illuminates. The feedback signal also illuminates the 'LH₂ umbilical purge' indicating light on the stage system status panel. Helium from Solenoid Valve A2321 flows through 10-micron Filter A2376 to purge the LH₂ fill line and through Manual Valve A2386 to purge the GH₂ vent line (described in Volume III).

6.3. Helium Transfer to the Helium Precool Heat Exchanger (figure 7)

Helium from the valve panel A inlet line flows to 6000-3000 psig Reference Pressure Regulator A2325 and 6000-3000 Primary Regulator A2330. The 'cold helium dome loader' switch on the pneumatic system control panel provides electrical control for remotely adjusting the reference pressure regulator. The 'cold helium dome loader energized' indicating light illuminates during adjustment of the reference pressure regulator. 3000-psig helium from the reference pressure regulator dome-loads the primary regulator and is monitored by Pressure Transducer A2328. Depressing the 'helium dome loader pressure' pushbutton applies signals from the transducer to the cold helium system pressure indicator on the pneumatic systems control panel, which displays the reference pressure regulator output pressure during adjustment. 3000-psig helium from Primary Regulator A2330 flows out of valve panel A into the helium precool heat exchanger (described in paragraph 7). The 'helium regulator outlet pressure' pushbutton applies electrical signals from Pressure Transducer A2333 to the cold helium system pressure indicator.

6.4. Valve Panel A GN₂ Supply (figure 7)

Valve panel A uses GN₂ for checkout purposes to conserve helium for launch operations. Valve panel B supplies 6000-psig GN₂ to valve panel A through GN₂ crossover Solenoid Valve A2320, which is energized (opened) by the 'GN₂ crossover' pushbutton switch on the pneumatic systems control panel. The same command also energizes (closes) GN₂ crossover vent Solenoid Valve A2318. When both solenoid valves have actuated, a feedback signal illuminates the 'GN₂ crossover operating' indicating light. GN₂ from the crossover line flows into

valve panel A pressure regulators. The valve panel operation is the same as described in paragraphs 6.1 through 6.3 except that GN₂ is used instead of helium. GN₂ flowing from the crossover line through Orifice A2322 provides an inert atmosphere in the valve panel.

7. HELIUM PRECOOL HEAT EXCHANGER

The helium precool heat exchanger, located on the 108-foot level of the umbilical tower, consists of a vacuum jacketed container filled with LH₂ and a helium coil submerged in the LH₂ (figure 7). The heat exchanger receives helium from valve panel A and cools it to -410°F before transfer to valve panel B. The LH₂ liquid level is maintained by opening and closing a supply valve in the LH₂ main fill and topping control unit.

From the main fill and topping unit, LH₂ flows through LH₂ Supply Valve A3917 into the area surrounding the helium coil unit. Liquid Level Sensor A3951 receives electrical power when the 'LH₂ level sensor' switch on the pneumatic systems control panel is placed in the 'on' position. The sensor maintains the proper LH₂ level in the heat exchanger by opening and closing the solenoid valve that controls LH₂ Supply Valve A3917 (Volume III). 'Maximum level,' 'high level,' and 'low level' indicating lights, on the pneumatic systems control panel, display the sensed LH₂ level. The sensor consists functionally of three capacitance-type switches; one at the low, one at the high, and one at the maximum LH₂ level. The high switch controls the solenoid valve; the other two are back-ups. When the low switch is not immersed, control circuitry energizes (opens) the solenoid valve and energizes the 'low level' indication. As the LH₂ level rises above the low switch, the solenoid valve remains energized but the 'low level' light is deenergized. As the LH₂ level rises above the high switch, control circuitry closes the solenoid valve (stopping LH₂ fill) and energizes the 'high level' indication. If the maximum switch should be immersed, the 'maximum level' indication would be energized; the 'high level' indication deenergized; and, if the solenoid valve were still energized, it would be deenergized. To ensure that LH₂ completely surrounds the heat exchanger helium coil at all times during the precool operation, the 'low level' switch on Liquid Level Sensor A3951 is above the coil.

GH₂ venting from the helium precool heat exchanger flows through a vent line down the umbilical tower to the launch facility burn pond. LH₂ boil-off is minimized by the vacuum jacket that insulates the LH₂ in the heat exchanger. An external vacuum gage can be connected to Vacuum Transducer A3953 to check the ability of the jacket to maintain a vacuum. Should pressure build up in the vacuum jacket, Burst Disc A3955 would rupture at 30 psig.

3000-psig helium flowing from valve panel A at 20 pounds per minute is cooled to -410°F as it flows through the coil in the heat exchanger. Temperature Transducer A3952 supplies electrical signals through the 'regulator outlet temperature' pushbutton to the cold helium temperature indicator on the pneumatic systems control panel.

Helium flowing from the heat exchanger enters the cold helium section of valve panel B.

8. VALVE PANEL B

Valve panel B, located at the 108-foot level of the umbilical tower, consists of a GN₂ section and a helium section (figure 7). The GN₂ section receives 6000-psig GN₂ from the PCD and effects distribution at 50 psig to various launch areas and vehicle LOX system purge networks, and at 750 psig to the LOX and LH₂ main fill and topping controls. The helium section receives 3000-psig helium from valve panel A via the helium precool heat exchanger and distributes 3000-psig helium to the S-IV stage cold helium spheres, and 50- to 500-psig helium to the LH₂ container pressurization system.

8.1. GN₂ Section Operation

6000-psig GN₂ flows from the PCD to valve panel B, through Filter A2520, and into a line that services valve panel A and several systems in valve panel B. The branch of the line from valve panel B supplies valve panel A with GN₂ as described in paragraph 6.4. GN₂ flows through Manual Valve A2525, Orifice A2526, and Snubber A2588 to purge and 'inert' the cabinet atmosphere.

6000-psig GN₂ flows to 6000-1500 psig Reference Pressure Regulator A2527 and 6000-1500 psig Primary Regulator A2529. Pressure Transducer A2521 supplies electrical signals through the 'gaseous nitrogen X 1000' pushbutton switch to the supply systems pressure indicator. GN₂ from the primary regulator flows to 1500-750 psig Reference Pressure Regulator A2536 and 1500-750 psig Primary Regulator A2540. Pressure Transducer A2535 provides electrical signals through the 'primary regulator X 1000' pushbutton switch to the ground valve control supply indicator. GN₂ from Primary Regulator A2540 flows to 750-50 psig Reference Pressure Regulator A2550, 750-50 psig Primary Regulator A2551, and Solenoid Valve A2546.

8.1.1. S-IV LOX Nozzle and Umbilical Purges. 50-psig GN₂ from Primary Regulator A2551 flows to Solenoid Valves A2561 and A2563. This pressure can be monitored on the purge supplies pressure indicator by depressing the 'LOX X 10' pushbutton, which applies electrical signals from Pressure Transducer A2555 to the indicator. LOX nozzle purge begins when the 'LOX nozzle purge' switch on the pneumatic system control panel is placed in the 'open' position. Solenoid Valve A2563 energizes and 50-psig GN₂ flows to the LOX nozzle (described in Volume II). When the solenoid valve opens, an electrical feedback signal illuminates the 'LOX nozzle purge valve open' indicating light. Solenoid Valve A2561 is energized by the 'LOX umbilical purge' switch on the propellant loading control and monitor panel. The 'LOX umbilical purge closed' indicating light goes out and the 'LOX umbilical purge opened' indicating light illuminates. 50-psig GN₂ flows through Filter A2562 to the LOX umbilical line (described in Volume II).

8.1.2. 750-psig GN₂ Ground Valve Control Supply. Solenoid Valve A2546, energized by the pneumatic system control panel 'valve control and umbilical retract' switch, permits 750-psig GN₂ flow through Filter A2547 to the control solenoid valves in valve panel B, to the LH₂ main fill and topping control (described in Volume III), to the S-IV main LOX fill and replenish control system (described in Volume II), and to Solenoid Valve A2263 in the GN₂ vent release system (described in Volume VII).

The control solenoid valves in valve panel B and the pneumatic valves that they control are listed below.

Solenoid Valve	Pneumatic Valve
A2584	A2583
A2585	A2586
A2577	A2576
A2578	A2539

8.2. Helium Section Operation (figure 7)

Helium flows from valve panel A to valve panel B via the helium precool heat exchanger as described previously. This cold, 3000-psig helium effects LH₂ container purge, LH₂ container pressurization, and S-IV stage cold helium spheres pressurization. After entering valve panel B, the helium flows through two lines: one to the S-IV stage cold helium system, and the other to the LH₂ container purge and pressurization system.

8.2.1. S-IV Stage Cold Helium System Supply. 3000-psig helium flows through Orifice A2582, cold helium supply Pneumatic Valve A2583, and Filter A2587 into the S-IV stage, where it pressurizes Cold Helium Spheres E233, E234, and E235 (described in Volume II). The 'cold helium supply-vent' switch in the 'supply' position energizes Solenoid Valve A2584, which supplies 750-psig GN₂ to the opening actuator of Pneumatic Valve A2583. Cold helium vent Pneumatic Valve A2586 is opened by Solenoid Valve A2585 when the 'cold helium supply-vent' switch is placed in the 'vent' position. When either of the pneumatic valves are open, a feedback signal from the valve illuminates the 'cold helium supply and vent opened' indicating light on the pneumatic systems control panel.

8.2.2. LH₂ Container Purge and Pressurization System Supply. 3000-psig helium flows through Orifice A2581, LH₂ pressurizing Pneumatic Valve A2539, and Filter A2574 into the S-IV stage, where it purges the LH₂ container (described in Volume III). Just prior to launch, the same line and components are used to pressurize the LH₂ container (also described in Volume III). When the S-IV stage LH₂ container vent valves close at T -140 seconds, they energize Solenoid Valve A2578, which supplies 750-psig GN₂ to the opening actuator of LH₂ pressurizing Pneumatic Valve A2539; and they energize Solenoid Valve A2577, which supplies 750-psig GN₂ to Pneumatic Vent Valve A2576 closing actuator.

Feedback from the pneumatic vent valve illuminates the 'LH₂ pressurization vent closed' indicating light on the pneumatic systems control panel, and feedback from the LH₂ pressurizing pneumatic valve illuminates the 'LH₂ pressurizing valve opened' indicating light on the same panel.

9. Q-BALL SYSTEM

9.1. Q-Ball (figure 10)

The Q-Ball system, mounted directly into the air stream on the forward end of the launch escape system, provides backup measurements to the accelerometer control. Basically, the Q-Ball system consists of Q-Ball H8, which contains pressure transducers, six pressure sensing ports (four for angle-of-attack and two for dynamic pressure), and an electronics package. The forward section of the Q-Ball contains the nose cap, the pneumatic manifolding, and the transducer package. The aft section contains the electronics circuit package.

The four angle-of-attack sensing ports are located in a circular pattern around the nose cap, with one port at each fin line. The two dynamic pressure ports are located at 45° between fin lines I and IV.

The basic parameter that Q-Ball H8 measures is differential pressure, proportional to the product of angle-of-attack (pitch and yaw) and dynamic pressure. Any deviation from planned course will create unequal pressures that are transmitted through the pressure tubes to the transducers in the Q-Ball system. Of the ten output signals from Q-Ball H8, four are transmitted to the vehicle; two pitch and two yaw. Six signals are telemetered to ground receiving stations; two each for dynamic pressure, pitch angle of attack × dynamic pressure, and yaw angle of attack × dynamic pressure.

9.2. Q-Ball Cover and Removal System (figure 10)

Q-Ball Cover A5809 protects Q-Ball H8 against weather, contamination, and other damage prior to launch. The cover consists of a rigid conical fiberglass shell and a soft fiberglass cloth that encloses an inflatable nylon liner. The shell is equipped with a fitting for attaching an inflation hose and with two rings for attaching a retractor cable and a shock cord. A weight ring is mounted in the base of the shell to eliminate the need for mechanically connecting the cover to the vehicle.

The Q-Ball cover removal system consists of an elastic shock cord, a pneumatic control panel, a pneumatic retractor assembly, and the inflatable cover. The elastic shock cord, pre-adjusted to 20 pounds tension, aids the weight ring in holding the cover on the Q-Ball and also provides one method of retracting the cover from the vehicle path after cover removal from the Q-Ball.

The pneumatic control panel filters, regulates, and controls the GN₂ operating pressure to the retractor assembly. The pneumatic retractor assembly, consisting of pneumatic Cylinder A5822, two pulleys, and two steel retractor cables, provides a second method of retracting the Q-Ball cover. The steel cables and two tandem mounted pulleys connect the piston rod of Cylinder A5822 and the top attachment ring on Q-Ball Cover A5809. The pulleys effect a 4:1 increase in the cover retract speed. GN₂ for inflation of the nylon liner in the Q-Ball cover flows from the pneumatic control panel through the inflation hose. The hose is clamped to the retraction cable, allowing sufficient slack to prevent fouling of the retraction cable during cover-retract operation.

9.3. Q-Ball Cover Removal

750-psig GN₂ from valve panel 5 enters the Q-Ball cover-removal pneumatic control panel through Filter A5802 and flows to a four-way junction. From one line of the junction, GN₂ passes through Orifice A5812 into the cabinet to purge and 'inert' the atmosphere. Bleed Fitting A5818 helps maintain a positive pressure in the cabinet by restricting GN₂ flow to atmosphere.

GN₂ from the four-way junction flows to retract Solenoid Valve A5810 and 750-30 psig Pressure Regulator A5811. GN₂ flows from the regulator to Cover Inflation Solenoid Valve A5821. Pressure Switches A5808 and A5819 provide 'retract pressure OK' and 'inflate pressure OK' signals to the LCC.

Between T -8 and T -7 minutes, two manually initiated commands from the blockhouse begin Q-Ball cover removal. The first command, 'retract cover', opens Solenoid Valve A5821 permitting 30-psig GN₂ to flow through the inflation hose to Q-Ball Cover A5809, inflating the nylon liner. Inflation of the liner pushes the cover upward, free of Q-Ball H8, and the shock cord then retracts the cover from the vehicle flight path.

To ensure complete cover removal and retraction, a second command, 'emergency retract cover,' opens retract Solenoid Valve A5810 four seconds after the first command. 750-psig GN₂ from the pneumatic control panel flows through Orifice A5823 to Pneumatic Retract Cylinder A5822. The retracting piston in Retract Cylinder A5822, through the retract cables attached to the Q-Ball cover, pulls the cover from the vehicle path. Piston speed is controlled by Orifice A5823. A limit switch actuates when the piston fully retracts, signaling to the blockhouse 'cover retracted.' If the nylon liner in Q-Ball Cover A5809 fails to inflate, the pneumatic retractor assembly has enough force to pull the cover from the Q-Ball and retract it from the vehicle path.

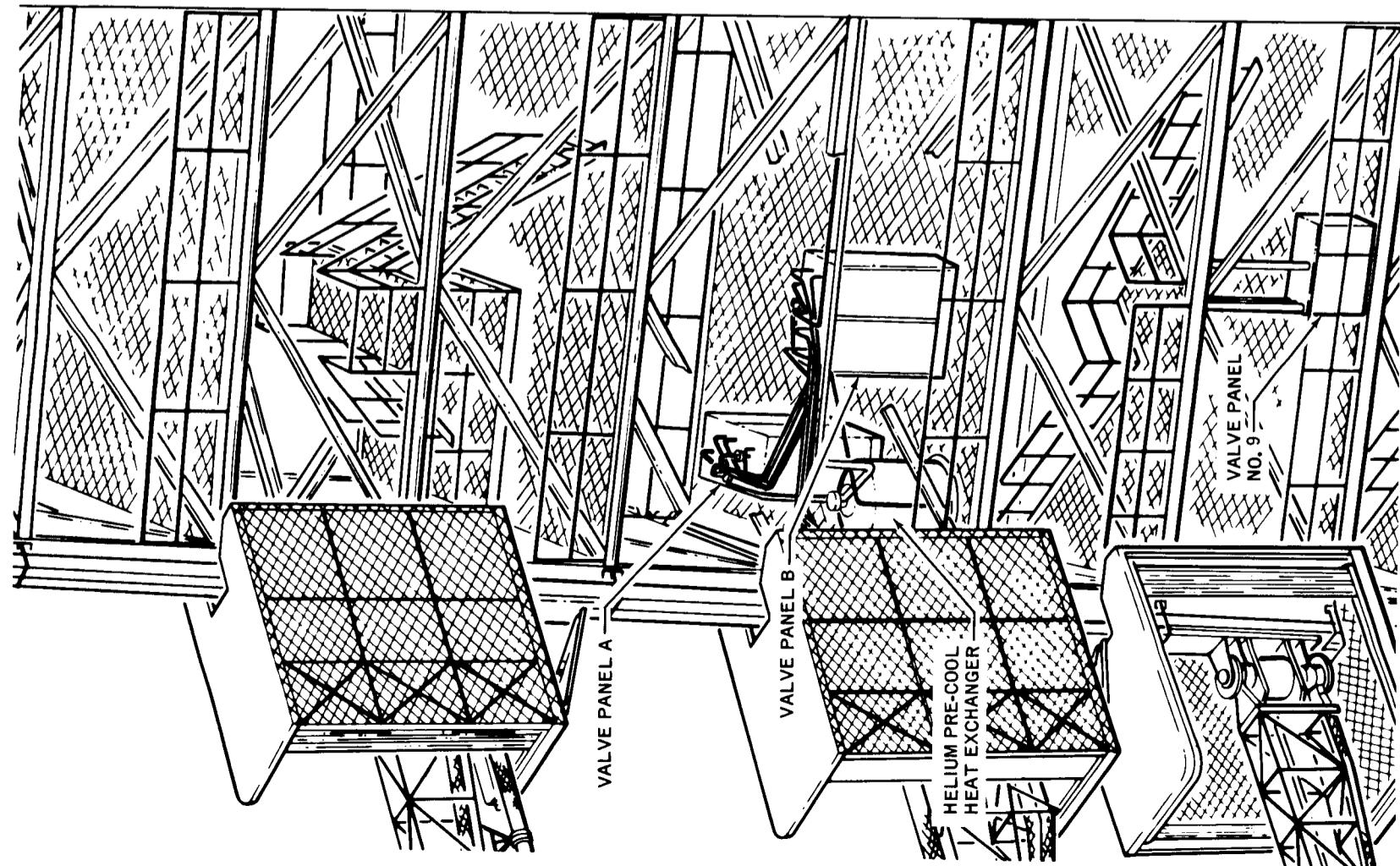
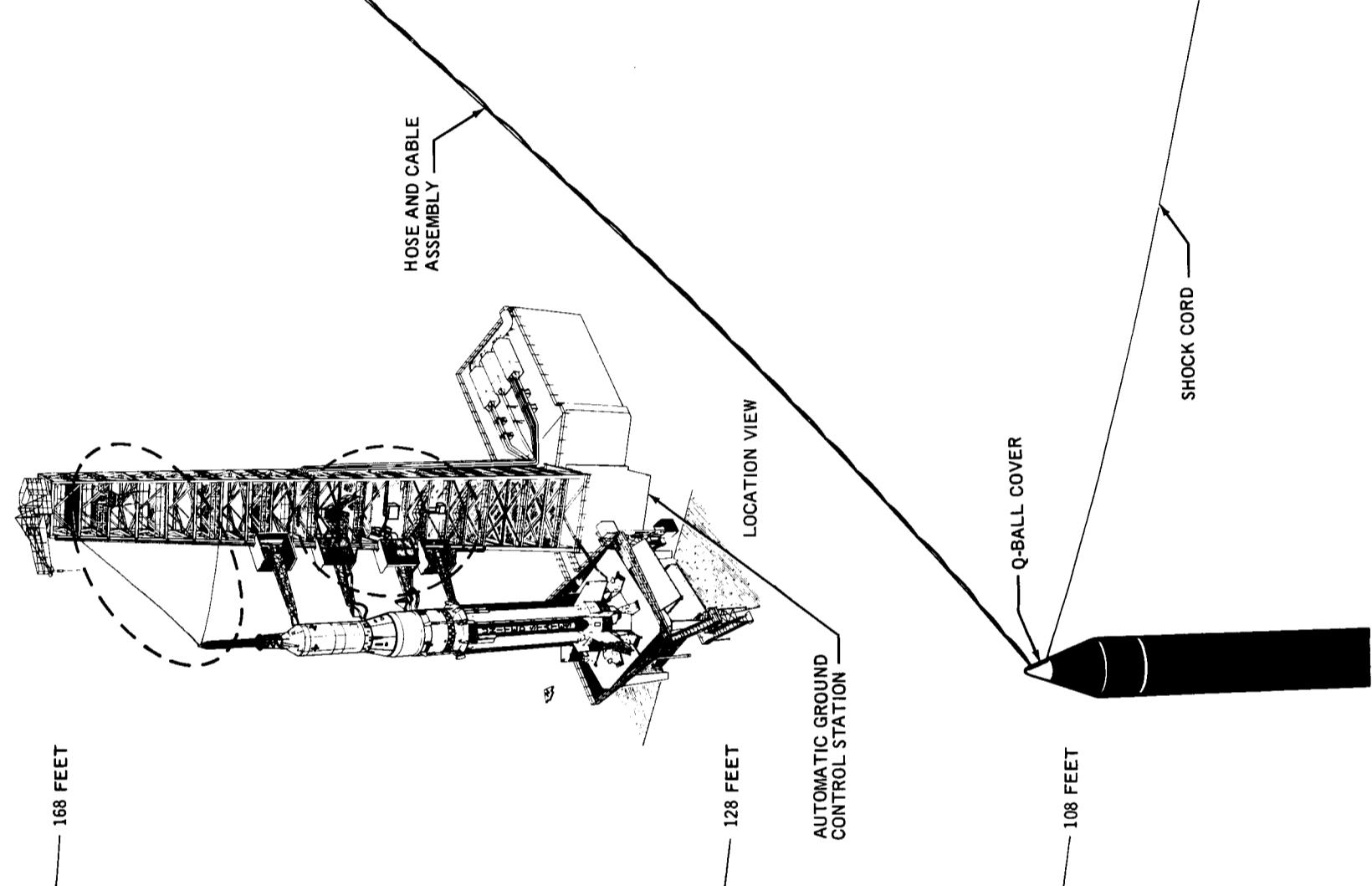
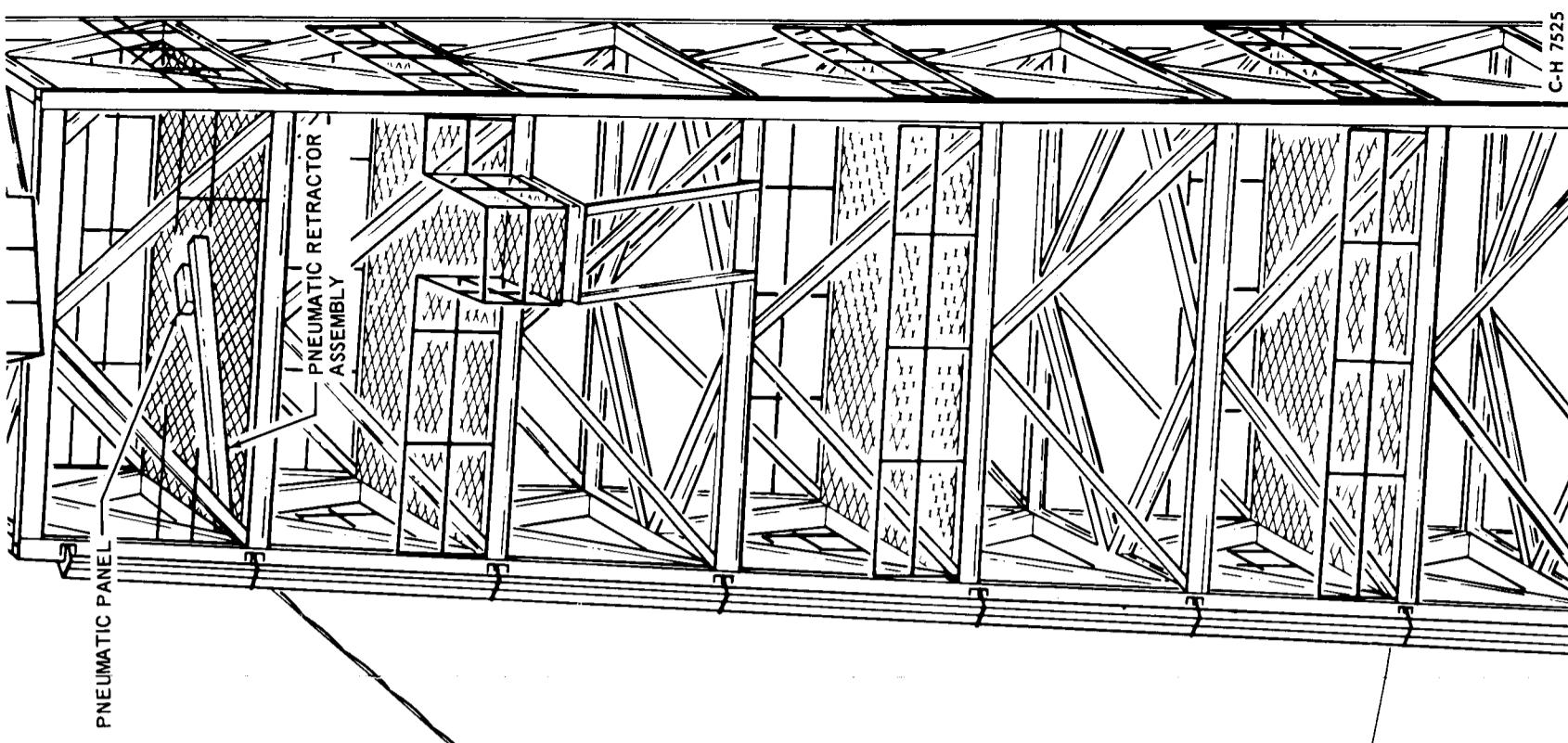


FIGURE 3. EQUIPMENT LOCATION

LIST OF FINDING NUMBERS

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1450						
A1451	1	Valve, Relief	Relief at 8000 \pm 200 psig Reseat at 6800 psig min.	Fluid Mechanics PN 2-920	75M50302	
A1452	1	Valve, Manual	2 in., Shut-Off	Annin Company PN 6510	75M50304	
A1453	1	Filter	10 Micron, 98% Nominal	Bendix PN 047213	75M50154-1	
A1454						
A1455						
A1456	1	Valve, Relief	Relief at 3350 \pm 150 psig Reseat at 3200 psig min.	Cornelius PN 116B100-2	75M50311-2	
A1457	1	Regulator, Dome Loaded	Primary Regulator, 6000 psig Inlet 3000 psig Outlet	Grove PN 10977HS08HR088D	75M50305-4	
A1458	1	Regulator, Dome Loaded	Primary Regulator, 6000 psig Inlet 3000 psig Outlet	Grove PN 10977HS08HR085D	75M50305-1	
A1459	1	Valve, Manual	2 in.	Annin Co. PN 4510	75M50306-2	
A1460						
A1461	1	Orifice	.031 in. dia.	Rocketdyne PN 9504-45062	10430000	

*Location: A = Ground; B = S-I Stage; E = S-IV Stage; G = Instrument Unit; H = Payload.

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1462	1	Silencer		C. W. Morris Co. PN AA-3	10434141-2	
A1463	1	Valve, Solenoid	N.O.	Marotta PN 202873-113 (MV74)	75M01351	55A10A5
A1464	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-15	
A1465	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, and Clark PN H249T1-4TT	10430234-1	
A1466	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A1467	1	Regulator, Manual	Reference Pressure, 6000 psig Inlet 3000 psig Outlet	Grove PN 10931MA2B	75M50165-13	
A1468	1	Gage, Pressure	0 to 10000 psig - Range 6000 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-18	
A1469	1	Transducer, Pressure	0 to 6000 psig - Range 6000 psig - Normal Reading	Giannini PN 46155NR-G-6000-20	75M50148-2	55A10A6
A1470						
A1471	1	Valve, Manual	1/4 in., Shut-Off	Futurecraft PN 30404S	75M50161-1	
A1472						
A1473	1	Valve, Manual	1/4 in., Vent	Futurecraft PN 30404S	75M50161-1	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1474						
A1475	1	Valve, Relief	Relief at 8000 ±200 psig Reseat at 6800 psig min.	Fluid Mechanics PN 2-920	75M50302	
A1476	1	Valve, Manual	2 in., Shut-Off	Annin Company PN 6510	75M50304	59A12
A1477	1	Filter	10 micron, 98% nominal	Bendix PN 047213	75M50154-1	
A1478						
A1479						
A1480	1	Valve, Relief	Relieves at 3350 ±150 psig Reseat at 3200 psig min.	Cornelius PN 116-B-100-2	75M50311-2	
A1481	1	Regulator, Dome Loaded	Primary Regulator 6000 psig Inlet 3000 psig Outlet	Grove PN 10977HS08HR088D	75M50305-4	
A1482	1	Regulator, Dome Loaded	Primary Regulator 6000 psig Inlet 3000 psig Outlet	Grove PN 10977HS08HR088D	75M50305-4	
A1483	1	Valve, Manual	2 in., Shut-off	Annin Company PN 4510	75M50306-3	59A22
A1484						
A1485	1	Orifice	.031 +.002 in. dia. .001 in. dia.	Rocketdyne PN 9504-45062	10430000	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1486	1	Silencer	3/8 in.	C. W. Morris Company PN AA-3	10434141-2	
A1487	1	Valve, Solenoid	N.O., 3-way	Marotta (Model MV74) PN 202873-113	7M01351	55A10A7
A1488	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	Marsh PN 210-3SSFMH	7M50147-15	
A1489	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-4TT	10430234-1	
A1490	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A1491	1	Regulator, Manual	Reference Pressure, 6000 psig Inlet 3000 psig Outlet	Grove PN 10931MA2B	75M50165-13	
A1492	1	Valve, Manual	1/4 in., Shut-Off	Futurecraft PN 30404S	75M50161-1	
A1493						
A1494	1	Valve, Manual	1/4 in., Vent	Futurecraft PN 30404S	75M50161-1	
A1495						
A1496	1	Valve, Relief	Cracks at 8000 ±200 psig Resets at 6800 psig min.	Fluid Mechanics PN 2-290	7M50302	
A1497	1	Valve, Manual	Shut-Off with Position Switches	Annin PN 6510	7M50304	59A13

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1498	1	Filter	10 microns, 98% nominal	Bendix PN 047213	75M50154	
A1499						
A1500	1	Valve, Manual	Shut-Off	Floddyne PN 2A11	75M51077-1	
A1501	1	Valve, Manual	Vent	Floddyne PN 2A11	75M51077-1	
A1502						
A1503						
A1504	1	Valve, Relief	Relief at 3350 ±150 psig Reseat at 3200 psig	Cornelius PN 116-B-100-2	75M50311-2	
A1505	1	Regulator, Dome Loaded	Primary Regulator 6000 psig Inlet 3000 psig Outlet	Grove PN 10977HS08HR088D	75M50305-4	
A1506	1	Regulator, Dome Loaded	Primary Regulator 6000 psig Inlet 3000 psig Outlet	Grove PN 10977HS08HR088D	75M50305-4	
A1507	1	Valve, Manual	2 in., Shut-Off	Anmin PN 4510	75M50306-3	59A23
A1508	1	Valve, Check	Cracking Pressure 4 psig max.	James, Pond, and Clark PN 1-1299T1-4TT	10430233-1	
A1509	1	Manifold	GN2 and He Vent			

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1510			A1510 through A1513 are not functionally applicable to this system.			
A1514	1	Silencer			75M50787	
			A1515 through A1523 are not functionally applicable to this system.			
A1524	1	Transducer, Pressure	0 to 4000 psig - Range 3000 psig - Normal Pressure	Giannini PN 46155NR-G-400-20MD	75M50148-1	55A10A8
A1525	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-15	
A1526	1	Valve, Relief	Relief at 3500 ±100 psig Reseat at 3200 psig min.	Fluid Mechanics PN 2-916	10430216-5	
A1527	1	Valve, Relief	Relief at 3500 ±100 psig Reseat at 3200 psig min.	Fluid Mechanics PN 2-916	10430216-5	
A1528	1	Valve, Check	1 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-16TI	10430234-5	
A1529	1	Valve, Manual	1 in., Vent	Futurecraft PN 30416S	75M50161-9	
A1530						
A1531						
A1532	1	Valve, Manual	1 in., Shut-Off	Futurecraft PN 30416S	75M50161-9	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1533	1	Valve, Manual	1 in., Shut-Off	Futurecraft PN 30416S	75M50161-9	
A1534	1	Valve, Manual	1 in., Shut-Off	Futurecraft PN 30416S	75M50161-9	
A1535	1	Valve, Manual	1 in., Shut-Off	Futurecraft PN 30416S	75M50161-9	
A1536	1	Valve, Manual	1 in., Shut-Off	Futurecraft PN 30416S	75M50161-9	
A1537	1	Valve, Manual	1 in., Shut-Off	Futurecraft PN 30416S	75M50161-9	
A1538 through A1540 are not functionally applicable to this system.						
A1541	1	Switch, Pressure	Actuates at 15 psig	Custom PN 8G46	10430405	55A10A11
A1542	1	Switch, Pressure	Actuates at 15 psig	Custom PN 8G46	10430405	55A10A12
A1543	1	Switch, Pressure	Actuates at 15 psig	Custom PN 8G46	10430405	55A10A13
A1544	1	Switch, Pressure	Actuates at 15 psig	Custom PN 8G46	10430405	55A10A14
A1545	1	Switch, Pressure	Actuates at 15 psig	Custom PN 8G46	10430405	55A10A15
A1546	1	Switch, Pressure	Actuates at 15 psig	Custom PN 8G46	10430405	55A10A16

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1547			A1547 through A1558 are not functionally applicable to this system.			
A1559	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A1560	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A1561	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A1562	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A1563	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A1564	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A1565			A1565 through A1567 are not functionally applicable to this system.			
A1568	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-6TR	10430234-2	
A1569	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-6TR	10430234-2	
A1570	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-6TR	10430234-2	
A1571	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-6TR	10430234-2	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1572	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-6TT	10430234-2	
A1573	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-6TT	10430234-2	
A1574		A1574 through A1576 are not functionally applicable to this system.				
A1577	1	Manifold	3000 psig GN2, Distributor		75M50178-1	
A1578						
A1579						
A1580	1	Manifold	3000 psig GN2, Vent		75M50177	
A1581	1	Valve, Shuttle	1/4 in., 3-way	Clary Dynamics PN 524255	10434448	
A1582						
A1583						
A1584	1	Valve, Manual	Shut-Off	Futurecraft PN 30416S	75M50161-9	
A1585	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-4TT	10430234-1	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1586	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-4TT	10430234-1	
A1587	1	Valve, Manual	2 in., Shut-Off	Annin Company PN 6510	75M50304	59A14
A1588	1	Filter	10 micron, 98% nominal	Bendix PN 047213	75M50154-1	
A1589						
A1590						
A1591	1	Valve, Relief	Relief at 3350 ±150 psig Reseat at 3200 psig min.	Cornelius PN 116B100-2	75M50311-2	
A1592	1	Regulator, Dome Loaded	Primary Regulator 6000 psig Inlet 3000 psig Outlet	Grove PN 10977HS08HR088D	75M50305-4	
A1593	1	Regulator, Dome Loaded	Primary Regulator 6000 psig Inlet 3000 psig Outlet	Grove PN 10977HS08HR085D	75M50305-1	
A1594	1	Valve, Manual	2 in., Shut-Off	Annin Company PN 4510	75M50306-3	59A24
A1595						
A1596	1	Orifice	.031 + .002 in. dia. .001 - in. dia.	Rocketdyne PN 9504-45062	1043000	
A1597	1	Silencer	3/8 in.	C. W. Morris PN AA-3	10434141-2	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1598	1	Valve, Solenoid	N.O., 3-way	Marotta (Model MV74) PN 202873-113	75M01351	5A10A18
A1599	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Nominal Reading	Marsh PN 210-3SSFMH	75M50147-15	
A1600	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A1601	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-4TT	10430234-1	
A1602	1	Regulator, Manual	Reference Pressure, 6000 psig Inlet 3000 psig Outlet	Grove PN 10931MA2B	75M50165-13	
A1603	1	Gage, Pressure	0 to 10000 psig - Range 6000 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-18	
A1604	1	Transducer, Pressure	0 to 6000 psig - Range 6000 psig - Normal Pressure	Giannini PN 46155NR-G-600-20	75M50148-2	5A10A19
A1605						
A1606	1	Valve, Manual	1/4 in., Shut-Off	Futurecraft PN 30404S	75M50161-1	
A1607						
A1608	1	Valve, Manual	1/4 in., Vent	Futurecraft PN 30404S	75M50161-1	
A1609						

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1610	1	Valve, Relief	Relief at 8000 ± 200 psig Reseat at 6800 psig min.	Fluid Mechanics PN 2-920	75M50302	
A1611	1	Valve, Manual	2 in., Shut-Off	Annin Company PN 6510	75M50304	59A15
A1612	1	Filter	10 micron, 98% nominal	Bendix PN 047213	75M50154-1	
A1613						
A1614						
A1615	1	Valve, Relief	Relief at 3350 ± 150 psig Reseat at 3200 psig min.	Cornelius PN 116B100-2	75M50311-2	
A1616	1	Regulator, Dome Loaded	Primary Regulator 6000 psig Inlet 3000 psig Outlet	Grove PN 10977HS08HR088D	75M50305-4	
A1617	1	Regulator, Dome Loaded	Primary Regulator 6000 psig Inlet 3000 psig Outlet	Grove PN 10977HS08HR088D	75M50305-4	
A1618	1	Valve, Manual	2 in., Shut-Off	Annin Company PN 4510	75M50306-2	59A25
A1619						
A1620	1	Orifice	.031 +.002 in. dia. .001 in. dia.	Rocketdyne PN 9504-45062	10430000	
A1621	1	Silencer	3/8 in.	C. W. Morris Company PN AA-3	10434141-2	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1622	1	Valve, Solenoid	N.O., 3-way	Marotta (Model MV74) PN 202873-113	75M01351	55A10A20
A1623	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-15	
A1624	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A1625	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-4TT	10430234-1	
A1626	1	Regulator, Manual	Reference Pressure 6000 psig Inlet 3000 psig Outlet	Grove PN 10931MA2B	75M50165-13	
A1627	1	Valve, Manual	1/4 in., Shut-Off	Futurecraft PN 30404S	75M50161-1	
A1628						
A1629	1	Valve, Manual	1/4 in., Vent	Futurecraft PN 30404S	75M50161-1	
A1630 through A1634 are not functionally applicable to this system.						
A1635	1	Manifold	3000 psig He, Distributor		75M50178-2	
A1636 through A1639 are not functionally applicable to this system.						
A1640	1	Transducer, Pressure	0 to 4000 psig - Range 3000 psig - Normal Pressure	Giannini PN 46155NR-G-400-20MOD	75M50148-1	55A10A21

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1641	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-15	
A1642	1	Valve, Relief	Relief at 3500 ±100 psig Reseat at 3200 psig min.	Fluid Mechanics PN 2-916	10430216-5	
A1643	1	Valve, Relief	Relief at 3500 ±100 psig Reseat at 3200 psig min.	Fluid Mechanics PN 2-916	10430216-5	
A1644	1	Valve, Check	1 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN HP249T1-16TT	10430234-5	
A1645	1	Valve, Manual	1 in., Vent	Futurecraft PN 30416S	75M50161-9	
A1646	1	Valve, Manual	3/8 in., Shut-Off	Futurecraft PN 30406S	75M50161-3	
A1647	1	Valve, Manual	1/2 in., Shut-Off	Futurecraft PN 30408S	75M50161-5	
A1648						
A1649						
A1650	1	Valve, Manual	1 in., Shut-Off	Futurecraft PN 30416S	75M50161-9	
A1651	1	Valve, Manual	1 in., Shut-Off	Futurecraft PN 30416S	75M50161-9	

A1652 through A1654 are not functionally applicable to this system.

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1655	1	Switch, Pressure	Actuates at 15 psig	Custom PN 8G46	10430405	55A10A22
A1656	1	Switch, Pressure	Actuates at 15 psig	Custom PN 8G46	10430405	55A10A23
A1657						
A1658						
A1659	1	Switch, Pressure	Actuates at 15 psig	Custom PN 8G46	10430405	55A10A26
A1660	1	Switch, Pressure	Actuates at 15 psig	Custom PN 8G46	10430405	55A10A27
A1661 through A1672 are not functionally applicable to this system.						
A1673	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A1674	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A1675						
A1676						
A1677	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1678	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
		A1679 through A1681 are not functionally applicable to this system.				
A1682	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-6TT	10430234-2	
A1683	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-6TT	10430234-2	
A1684						
A1685						
A1686	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-6TT	10430234-2	
A1687	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-6TT	10430234-2	
		A1688 through A1693 are not functionally applicable to this system.				
A1694	1	Valve, Manual	1 in.	Futurecraft PN 30416S	75M50161-9	
A1695						
A1696						

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A1697	1	Manifold	3000 psig He, Vent		75M50177-2	
A1698						
A1699	1	Valve, Relief	Relief at 8000 ±200 psig Reseat at 6800 psig	Fluid Mechanics PN 2-920	75M50302	
A1700 through A2051 are not functionally applicable to this system.						
A2052	1	Filter	5 micron, 95% nominal	Bendix PN 041675	10434444-3	
A2053	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-15	
A2054	1	Manifold	3000 psig GN2, Supply		75M50175	
A2055	1	Valve, Manual	1/2 in., Shut-Off	Marotta SPV-27 PN 223143-3	75M51064-3	
A2056	1	Regulator, Manual	Reference Pressure 3000 psig Inlet 50 psig Outlet	Wallace O. Leonard PN 146050-34	10437835-2	
A2057	1	Regulator, Dome Loaded	Primary Regulator 3000 psig Inlet 50 psig Outlet	Marotta PN 226944-1	75M51102-1	
A2058	1	Valve, Relief	Relief at 60 ±3 psig Reseat at 54 psig min.	Fluid Mechanics PN 2-846	10430216-6	
A2059	1	Gage, Pressure	0 to 100 psig - Range 50 psig - Normal Reading	Marsh PN 210-GSFMH	75M50147-4	

FINDING NUMBER	NO. REQ'D	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2060	1	Valve, Shuttle	1/4 in. Actuates at 35 ± .75 psig Deactuates at 2 psi Below Actuation Pressure	Clary Dynamics PN 524255	10434448	
A2061	1	Switch, Pressure		Southwestern Ind. Inc. PN PS3704-35	10434297-3	55A5A10
A2062						
A2063	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A2064						
A2065						
A2066	1	Valve, Manual	1/2 in., Shut-off	Marotta SPV-27 PN 223143-3	75M51064-3	
A2067	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A2068	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H299T1-4TT	10430233-1	
A2069						
A2070						
A2071	1	Filter	2 micron, 95% nominal	Bendix PN 047309	10434444-1	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2072	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H299T1-4TR	10430233-1	
A2073						
A2074			Actuates at 15 ±5 psid Deactuates at 5 psi Below Actuation Pressure	Custom Components PN 8G46	10430405	55A5A12
A2075	1	Switch, Pressure		Cramer Controls Corp. PN 61S45	75M50172-2	55A5A13
A2076	1	Meter, Elapsed Time	0 to 9999.9 hr.	Robbins PN SSNA-375A-6T-768	75M01305-2	
A2077	1	Valve, Manual	3/8 in.			
A2078						
A2079	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H299T1-6TR	10430233-2	
A2080	1	Filter, Mechanical	10 micron, water separator	Robbins PN RAF-SPE (A847)	75M50173-1	
A2081	1	Purifier	Oil vapor removed to 1 ppm dewpoint of -100°F	Robbins PN RAF-2SP-769 & RAF-SPT13X	75M50174-1&2	
A2082	1	Orifice	.084 ± 001 in. dia. 275 SCFM	A. U. Stone PN H93C-.084	75M50184-4	
A2083	1	Valve, Solenoid	3/8 in., N.C.	Marotta (MV1307) PN 212783-1	10437739	55A5A7

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2084	1	Valve, Manual	3/8 in., Bypass	Robbins PN SSNA-375A-6T-768	75M01305-2	
A2085	1	Valve, Manual	1/4 in., Bearing Spheres Test Outlet	Robbins PN SSNA-250-4T-787	75M01305-1	
A2086						
A2087	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA250-4T-787	75M01305-1	
A2088	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H299T1-4TR	10430233-1	
A2089						
A2090	1	Regulator, Manual	Reference Pressure 3000 psig Inlet 750 psig Outlet	Wallace O. Leonard PN 187040-2	75M50182	
A2091	1	Regulator, Dome Loaded	Primary Regulator 3000 psig Inlet 750 psig Outlet	Grove PN 10988A068B	75M01356-2	
A2092	1	Manifold	750 psig GN ₂ , Supply		75M50175-2	
A2093	1	Valve, Relief	Relief at 875 ± 44 psig Reseat at 790 psig min.	Fluid Mechanics PN 2-847	10430216-3	
A2094	1	Gage, Pressure	0 to 1000 psig - Range 750 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-11	
A2095	1	Valve, Shuttle	1/4 in.	Clary Dynamics PN 524255	10434448	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2096	1	Switch, Pressure	Actuates at 625 ± 25 psig Deactuates at 50 psi below actuation pressure	Southwestern Ind. Inc. PN SS5116-625	10434443-6	55A5A5
A2097						
A2098	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A2099	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H299T1-4TT	10430233-1	
A2100						
A2101				Robbins		
A2102	1	Purifier	Oil vapor removed to 1 ppm dewpoint of -100°F	PN RAF-2SP-769 & RAF-SPT13X	75M50174-1 & -2	
A2103	1	Purifier	Oil vapor removed to 1 ppm dewpoint of -100°F	PN RAF-2SP-769 & RAF-SPT13X	75M50174-1 & -2	
A2104 through A2107 are not functionally applicable to this system.						
A2108	1	Valve, Manual	3/8 in., Shut-Off	Robbins PN SSNA-375A-6T-768	75M01305-2	
A2109	1	Regulator, Preset	750 psig Inlet 25 ± 2 psig Outlet	Wallace O. Leonard PN 146050-28	10437835-1	
A2110	1	Valve, Relief	Relief at 40 ± 2 psig Reseat at 33 psig min.	James, Pond, & Clark PN 5159T1-6TB-40	10430079-1	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2111	1	Gage, Pressure	0 to 60 psig - Range 25 psig - Normal Reading	Marsh PN 210-CSFMH	75M50147-3	
A2112	1	Valve, Shuttle	1/4 in.	Clary Dynamics PN 524255	10434448	
A2113	1	Switch, Pressure	Actuates at 21.5 + .5 psig Deactuates at 1.5 psi below actuation pressure	Southwestern Ind. Inc. PN PS3704-21.5	10434297-4	55A5A4
A2114						
A2115	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A2116	1	Silencer	1/2 in.	C.W. Morris PN AA-4	10434141-1	
A2117						
A2118						
A2119	1	Valve, Manual	1/2 in., Shut-Off	Marotta SPV-27 PN 223143-3	75M51064-3	
A2120	1	Regulator, Manual	Reference Pressure 750 psig Inlet 50 psig Outlet	Wallace O. Leonard PN 146050-28	10437835-1	
A2121	1	Regulator, Dome Loaded	Primary Regulator 3000 psig Inlet 50 psig Outlet	Marotta PN 226944-1	75M51102-1	
A2122	1	Valve, Relief	Relief at 60 ± 3 psig Reseat at 54 psig min.	Fluid Mechanics PN 2-846	10430216-6	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2123	1	Gage, Pressure	0 to 100 psig - Range 50 psig - Normal Reading	Marsh PN 210-CSFMH	75M50147-4	
A2124	1	Valve, Shuttle	1/4 in. Actuates at 35 ± .75 psig Deactuates at 2 psig below Actuation Pressure	Clary Dynamics PN 524255	10434448	
A2125	1	Switch, Pressure		Southwestern Ind. Inc. PN PS3704-35	10434297-3	55A5A6
A2126						
A2127	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A2128	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H249T1-4TT	10430234-1	
A2129						
A2130	1	Valve, Manual	1/2 in., Shut-Off	Marotta SPV-27 PN 223143-3	75M51064-3	
A2131	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A2132	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H299T1-4TT	10430233-1	
A2133						
A2134	1	Valve, Check	Cracking Pressure 4 psig max.	James, Pond, & Clark PN H299T1-16TT	10430233-5	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2135	1	Valve, Solenoid	N.O., 3-way	Marotta PN 204424 Model 123	10425701	55A5A3
A2136	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H299T1-4TT	10430233-1	
A2137						
A2138	1	Valve, Solenoid	N.C., 3-way	Marotta PN 204424 Model 123	10425701	55A5A2
A2139	1	Valve, Manual	1/4 in., Vent	Hoke Series 280 PN 4PY281	75M02711-2	
A2140	1	Valve, Check	1/4 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN H299T1-4TT	1040233-1	
A2141 through A2143 are not functionally applicable to this system.						
A2144	1	Filter	5 micron, 95% nominal	Bendix PN 041675	10434444-3	
A2145	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-15	
A2146	1	Valve, Solenoid	3/8 in., N.C.	Marotta (MV130T) PN 212783-1	10437739	55A5A8
A2147	1	Valve, Manual	3/8 in., By Pass	Robbins PN SSNA-375A-6T-768	75M01305-2	
A2148						

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2149						
A2150	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A2151	1	Valve, Check	1/4 in., Cracking Pressure 4 psig, max.	James, Pond, & Clark PN H299T1-4TT	10430233-1	
A2152	through A2156	are not functionally applicable to this system.				
A2157	1	Valve, Relief	Relief at 70 ±5 psig Reseat at 55 psig min.	James, Pond, & Clark PN 5159T1-4TB-70	10430079-5	
A2158	1	Valve, Relief	Relief at 70 ±5 psig Reseat at 55 psig min.	James, Pond, & Clark PN 5159T1-4TB-70	10430079-5	
A2159						
A2160						
A2161	1	Gage, Pressure	0-1000 psig - Range 750 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-11	
A2162	1	Valve, Manual	1 in., Supply Shut-Off	Marotta PN 223774-1	75M51063-1	
A2163	1	Valve, Manual	3/8 in., Vent	Robbins PN SSNA-375A-6T-768	75M01305-2	
A2164	1	Valve, Check	Cracking Pressure 4 psig max.	James, Pond, & Clark PN H299T1-6TT	10430233-2	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2165	1	Valve, Check	Cracking Pressure 4 psig max.	James, Pond, & Clark PN H299T1-16TT	10430233-5	
A2166		A2166 through A2299 are not functionally applicable to this system.		DAC (Douglas Aircraft Co.) PN 3864055-1		
A2300	1	Valve, Manual	1/2 in.			
A2301						
A2302	1	Filter	1/2 in., 10 micron	DAC PN 3864058-1		
A2303						
A2304	1	Transducer, Pressure		DAC PN 7861472-555		
A2305						
A2306	1	Gage, Pressure	0 to 10000 psig - Range 6000 psig - Normal Reading	DAC PN S-3732740V-12		
A2307						
A2308	1	Snubber				
A2309		A2309 through A2311 are not functionally applicable to this system.				

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2312	1	Valve, Solenoid	N.C.	DAC PN 3864060-1		497ES6
A2313						
A2314	1	Valve, Solenoid	N.O.	DAC PN 3864060-1		497ES5
A2315						
A2316	1	Valve, Check	1/2 in.	DAC PN 3864067-1		
A2317	1	Valve, Check	1/2 in.	DAC PN 3864067-1		
A2318	1	Valve, Solenoid	N.O.	DAC PN 3864061-1		497NS5
A2319	1	Snubber				
A2320	1	Valve, Solenoid	N.O.	DAC PN 3864060-1		497NS4
A2321	1	Valve, Solenoid	N.C.	DAC PN 3864062-501		497ES1
A2322	1	Orifice				
A2323						

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2324	1	Valve, Manual	1/2 in. Remotely Controlled 6000 psig Inlet 3000 psig Outlet	DAC PN 3864055-1		
A2325	1	Regulator, Solenoid Operated		DAC PN 5865918-1		497E8
A2326	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	DAC PN S-373274OU-12		
A2327	1	Snubber				
A2328	1	Transducer, Pressure		DAC PN 5865846		497PT22
A2329						
A2330	1	Regulator, Dome Loaded	Primary Regulator 6000 psig Inlet 3000 psig Outlet	DAC PN 3864065-1		
A2331	1	Valve, Relief	Relief at 3500 ±105 psig Reseat at 3000 psig min.	DAC PN 384068-507		
A2332						
A2333	1	Transducer, Pressure		DAC PN 5865846		497PT23
A2334	1	Snubber				
A2335	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	DAC PN S-373274OU-12		

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2336	1	Valve, Manual	1/4 in., Vent	DAC PN 3864056-1		
A2337		A2337 through A2342 are not functionally applicable to this system.				
A2343	1	Valve, Manual	1/2 in.	DAC PN 3864055-1		
A2344	1	Regulator, Solenoid Operated	Remotely Controlled 6000 psig Inlet 3000 psig Outlet	DAC PN 5865918-1		497E5
A2345	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	DAC PN S-373274OU-12		
A2346	1	Snubber		DAC PN 5865846		
A2347	1	Transducer, Pressure				497PT19
A2348						
A2349	1	Regulator, Dome Loaded	Primary Regulator 6000 psig Inlet 3000 psig Outlet	DAC PN 3864065-1		
A2350	1	Valve, Manual	1/2 in.	DAC PN 3864056-501		
A2351	1	Regulator, Manual	Reference Pressure 3000 psig Inlet 5000 psig Outlet	DAC PN 3864064-501		
A2352	1	Gage, Pressure	0 to 1000 psig - Range 500 psig - Normal Reading	DAC PN S-373274OM-12		

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2353	1	Snubber				
A2354						
A2355	1	Regulator, Dome Loaded	Primary Regulator 3000 psig Inlet 500 psig Outlet	DAC PN 3864066-1		
A2356						
A2357	1	Transducer, Pressure		DAC PN 5865846		497PT17
A2358	1	Snubber				
A2359	1	Gage, Pressure	0 to 1000 psig - Range 5000 psig - Normal Reading	DAC PN S-3732740M-12		
A2360	1	Regulator, Manual	Reference Pressure 500 psig Inlet 50 psig Outlet	DAC PN 3864064-1		
A2361	1	Gage, Pressure	0 to 100 psig - Range 50 psig - Normal Reading	DAC PN S-3732740E-12		
A2362	1	Snubber				
A2363						
A2364	1	Regulator, Dome Loaded	Primary Regulator 500 psig Inlet 50 psig Outlet	DAC PN 3864066-1		

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2365						
A2366	1	Transducer, Pressure		DAC PN 5865846		497PT16
A2367	1	Snubber				
A2368	1	Gage, Pressure	0 to 100 psig - Range 50 psig - Normal Reading	DAC PN S-3732740E-12		
A2369	1	Valve, Manual	1/4 in., Vent	DAC PN 3864056-1		
A2370	1	Valve, Relief	Relief at 60 ±1.8 psig Reseat at 50 psig min.	DAC PN 3864068-501		
A2371	1	Valve, Solenoid	N.C.	DAC PN 3864062-1		497ES2
A2372	1	Orifice		DAC PN 2253887-4C-024		
A2373						
A2374						
A2375	1	Valve, Manual	1/4 in.	DAC PN 3864056-1		
A2376	1	Filter	1/2 in., 10 micron	DAC PN 3865916-1		

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2377						
A2378	1	Transducer, Pressure		DAC PN 5865846	497PT18	
A2379	1	Snubber				
A2380	1	Gage, Pressure	0 to 5000 Psig - Range 3000 Psig - Normal Reading	DAC PN S-373274OU-12		
A2381	1	Valve, Relief	Relief at 3500 ±105 psig Reseat at 3000 psig min.	DAC PN 3864068-507		
A2382	1	Valve, Manual	1/4 in., Vent	DAC PN 3864056-1		
A2383	1	Valve, Solenoid	N.C.	DAC PN 3864062-501		
A2384	1	Filter	1/2 in., 10 micron	DAC PN 3865916-1		
A2385	1	Snubber				
A2386	1	Valve, Manual	1/2 in.	DAC PN 3864056-501		
A2387 through A2518 are not functionally applicable to this system.						
A2519	1	Valve, Manual	1/2 in.	DAC PN 3864055		

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2520	1	Filter	10 micron	DAC PN 3864058-1		
A2521	1	Transducer, Pressure		DAC PN 7861472-539		498PT25
A2522	1	Gage, Pressure	0 to 10000 psig - Range 6000 psig - Normal Reading	DAC PN S-3732740V-12		
A2523	1	Snubber				
A2524						
A2525	1	Valve, Manual	1/4 in., Vent	DAC PN 3864056-1		
A2526	1	Orifice	Reference Pressure			
A2527	1	Regulator, Manual	6000 psig Inlet 3000 psig Outlet	DAC PN 3864064-509		
A2528	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	DAC PN S-3732740U-12		
A2529	1	Regulator, Dome Loaded	Primary Regulator 6000 psig Inlet 3000 psig Outlet	DAC PN 3864065-1		
A2530	1	Snubber				
A2531						

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2532	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	DAC PN S-3732740U-12		
A2533	1	Snubber				
A2534						
A2535	1	Transducer, Pressure	1/4 in.	DAC PN 7861472-547	498PT26	
A2536	1	Regulator, Manual	Reference Pressure 1500 psig Inlet 750 psig Outlet	DAC PN 3864064-503		
A2537	1	Gage, Pressure	0 to 1000 psig - Range 750 psig - Normal Reading	DAC PN S-3732740M-12		
A2538	1	Snubber				
A2539	1	Valve, Pneumatic	2 1/2 in., N.C.	DAC PN 3864048-1	498EP2	
A2540	1	Regulator, Dome Loaded	Primary Regulator 1500 psig Inlet 750 psig Outlet	DAC PN 3864066-1		
A2541						
A2542	1	Snubber				
A2543	1	Gage, Pressure	0 to 1000 psig - Range 750 psig - Normal Reading	DAC PN S-3732740M-12		

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2544	1	Transducer, Pressure		DAC PN 7861472-529		498PT13
A2545	1	Valve, Relief	Relief at 850 ±25.5 psig Reseat at 750 psig min.	DAC PN 3864068-1		
A2546	1	Valve, Solenoid	1/2 in., N.C.	DAC PN 3864062-501		498NS1
A2547	1	Filter	1/2 in., 10 micron	DAC PN 3865916-1		
A2548	1	Valve, Manual	1/4 in., Vent	DAC PN 3864056-1		
A2549	1	Valve, Manual	Shut-Off	DAC PN 3864056-501		
A2550	1	Regulator, Manual	Reference Pressure 750 psig Inlet 50 psig Outlet	DAC PN 3864064-1		
A2551	1	Regulator, Dome Loaded	Primary Regulator 750 psig Inlet 50 psig Outlet	DAC PN 3864066-1		
A2552						
A2553	1	Snubber				
A2554	1	Gage, Pressure	0 to 100 psig - Range 50 psig - Normal Reading	DAC PN S-3732740E-12		
A2555	1	Transducer, Pressure		DAC PN 7861472-509		498PT14

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2556	1	Gage, Pressure	0 to 100 psig - Range 50 psig - Normal Reading	DAC PN S-3732740E-12		
A2557	1	Snubber				
A2558						
A2559	1	Valve, Relief	Relief at 60 ±1.8 psig Reseat at 50 psig min.	DAC PN 3864068-501		
A2560	1	Valve, Manual	1/4 in., Vent	DAC PN 3864056-1		
A2561	1	Valve, Solenoid	N.C.	DAC PN 3864062-501		498NS2
A2562	1	Filter	1/2 in., 10 micron	DAC PN 3865916-1		
A2563	1	Valve, Solenoid	1/4 in., N.C.	DAC PN 3864062-1		498NS3
A2564 through A2572 are not functionally applicable to this system.						
A2573	1	Valve, Manual	1/2 in.	DAC PN 3864056-501		
A2574	1	Filter	1 3/4 in., 10 micron	DAC PN 3865916-1		
A2575	1	Valve, Manual	1/4 in., Vent	DAC PN 3864056-1		

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2576	1	Valve, Pneumatic	4 1/4 in., N.C.	DAC PN 3865919-1		498EP3
A2577	1	Valve, Solenoid	N.C.	DAC PN 3863940-1		498NS8
A2578	1	Valve, Solenoid	N.C.	DAC PN 3863940-1		498NS7
A2579						
A2580	1	Valve, Check	1/2 in.	DAC PN 3864057-1		
A2581	1	Orifice				
A2582	1	Orifice				
A2583	1	Valve, Pneumatic	2 1/2 in., N.C.	DAC PN 3864048-1		498EP1
A2584	1	Valve, Solenoid	1/4 in.	DAC PN 3863940-1		498NS6
A2585	1	Valve, Solenoid	1/4 in.	DAC PN 3863940-1		498NS9
A2586	1	Valve, Pneumatic	4 1/4 in., N.C.	DAC PN 3865919-501		498EP6
A2587	1	Filter	1/2 in., 10 micron	DAC PN 3865916-1		

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A2588	1	Snubber				
		A2589 and A2590 are not functionally applicable to this system.		DAC PN S2253887-8C-250		
A2591	1	Orifice		DAC PN S2253887-8C-172		
A2592	1	Orifice				
		A2593 through A3047 are not functionally applicable to this system.				
A3048	1	Coupling-Half, Quick Disconnect	3000 psig He	E. B. Wiggins Oil Tool Co. Inc. PN 6300R10244	75M02220	
		A3049 through A3051 are not functionally applicable to this system.				
A3052	1	Orifice	0.2 in. dia.		75M04703	
		A3053 through A3062 are not functionally applicable to this system.				
A3063	1	Coupling-Half, Quick Disconnect	Fuel Spheres Pressurize	E. B. Wiggins Oil Tool Co. Inc. PN 6200R76A12	75M02218	
		A3064 through A3155 are not functionally applicable to this system.				
A3156	1	Coupling-Half, Quick Disconnect	Control He Fill	E. B. Wiggins Oil Tool Co. Inc. PN 6200R78A4	75M02212	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A3157						
			A3157 through A3247 are not functionally applicable to this system.			
A3248	1	Coupling-Half, Quick Disconnect	Air Bearing Sphere Fill	E. B. Wiggins Oil Tool Co. Inc. PN 6200R67A6	75M02216	
A3249			A3249 through A3257 are not functionally applicable to this system.			
A3258	1	Valve, Check	Cracking Pressure 3 psig	James, Pond, & Clark PN P-4-698-3	75M00178	
A3259	1	Orifice	.031 in. dia.	A. U. Stone PN H228-031	75M50562-1	
A3260			A3260 through A3949 are not functionally applicable to this system.			
A3950	1	Heat Exchanger		DAC PN 7863909-501		
A3951	1	Sensor, Liquid Level	Low, High & Maximum Level Indication	DAC PN 7864143-501		
A3952	1	Transducer, Temperature		DAC PN 7861475-551		
A3953	1	Transducer, Pressure	0 to 1000 microns Hg. Vacuum - Range 50 Microns - Normal	Consolidated Vacuum Corp. PN GTC-004		
A3954	1	Valve, Manual	Vent	VECCO PN R100P		
A3955	1	Disc, Burst	Rupture at 30 ±5 psig			

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A3956			A3956 through A5000 are not functionally applicable to this system.			
A5001	1	Valve, Manual	1 in., Shut-Off	Marotta PN 223774	75M51063	
A5002	1	Filter	5 micron, 98.6% Nominal	Bendix PN 041675	10434444-3	
A5003						
A5004	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	U. S. Gauge PN AW1827AK01	10437806-9	
A5005	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A5006	1	Valve, Manual	1/4 in. Fuels Spheres Test Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A5007	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A5008	1	Valve, Manual	3/8 in., Bypass	Robbins PN NT-180	10437694	
A5009	1	Valve, Solenoid	N.C.	Marotta PN 212783-1 (MV130T)	10437739	57A9A5
A5010	1	Valve, Solenoid	N.C.	Marotta PN 216774-1 (MV159CA)	10437737	57A9A14
			A5011 through A5013 are not functionally applicable to this system.			

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5014	1	Silencer	3/8 inch	C. W. Morris PN AA-3	10434141-2	
		A5015 through A5017 are not functionally applicable to this system.				
A5018	1	Regulator, Dome Loaded	3000 psig Inlet 750 psig Outlet	Grove PN M12951N	75M02156-2	
A5019	1	Regulator, Manual	3000 psig Inlet 750 psig Outlet	W. O. Leonard PN 187040-2	75M50182	
A5020	1	Valve, Relief	Relief at 850 \pm 43 psig Reseat at 770 psig min.	James, Pond, & Clark PN 5159T1-6TT-1020	75M02172-3	
A5021	1	Gage, Pressure	0 to 1000 psig - Range 750 psig - Normal Reading	U. S. Gauge PN AW1827AH01	10437804	
A5022	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A5023	1	Valve, Solenoid	N.C., 3-way	Marotta (MV123) PN 204424	10425701	57A9A6
		A5024 through A5045 are not functionally applicable to this system.				
A5046	1	Valve, Manual	3/8 in.	Robbins PN NT-180	10437694	
A5047	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	U. S. Gauge PN AW1827AK01	10437806-9	
A5048	1	Filter	0.80 \pm 0.05 microns nominal	Millipore PN XX4504700	75M50561-1	

FINDING NUMBER	NO. REQ'D	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5049						
A5050	1	Regulator, Manual	3000 psig Inlet 450 psig Outlet	W. O. Leonard PN 128390-4	75M50726-2	
A5051						
A5052						
A5053	1	Orifice	450 to 150 psig Pressure Reduction	W. O. Leonard PN 156040-5	75M50727-2	
A5054						
A5055	1	Switch, Pressure	Actuates at 50 psig Increasing Pressure, Deactuates at 100 psig Inc. Press.	Meletron PN M7141EB-32A-2	75M50728-1	57A9A3
A5056	1	Orifice	50 psig to 16 psig Pressure Reduction (APPROX.)	A. U. Stone PN P881-8	75M04165-8	
A5057 through A5060 are not functionally applicable to this system.						
A5061	1	Orifice	450 psig to 150 psig Pressure Reduction	W. O. Leonard PN 156040-5	75M50727-2	
A5062						
A5063	1	Switch, Pressure	Actuates at 50 psig Increasing Pressure, Deactuates at 100 psig Inc. Press.	Meletron PN M7141EB-32A-1	75M50728-1	57A9A4

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5064	1	Orifice	50 psig to 16 psig Pressure Reduction (Approx.)	A. U. Stone PN P881-8	75M04165-8	
		A5065 through A5072	are not functionally applicable to this system.			
A5073	1	Valve, Relief	1/4 in., Relief at 600 psig	James, Pond, & Clark PN 5159T1-4TB-600	10430079-6	
		A5074 through A5077	are not functionally applicable to this system.			
A5078	1	Orifice	.031 ± .001 in. dia.	A. U. Stone PN H228-031	75M50562-1	
A5079	1	Plate, Calibrated Bleed	1248 scfm at 3 in. H ₂ O	Del Mfg. Co. PN 10023	75M02047	
		A5080 through A5151	are not functionally applicable to this system.			
A5152	1	Filter	5 micron, 98.6% nominal	Bendix PN 041675	10434444-3	
A5153	1	Filter	5 micron, 98.6% nominal	Bendix PN 041675	10434444-3	
A5154	1	Valve, Solenoid	TC Fuel Injector Purge Dome-Loader Vent, N.C.	Marotta Model MV159CA	10437737	55A6A24
A5155						
A5156	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-15	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5157	1	Manifold	3000 psig GN2, Supply		10432680	
A5158	1	Valve, Solenoid	N.C.	Marotta PN 212783-1 (MV-130T)	10437739	55A6A3
A5159	1	Valve, Manual	3/8 in., Bypass	Robbins PN NT-180	10437694	
A5160	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A5161	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN HP299T1-6TT	10430233-2	
A5162 through A5164 are not functionally applicable to this system.						
A5165	1	Valve, Manual	1/2 in.	Marotta PN 223143-3	75M51064-3	
A5166	1	Regulator, Manual	Reference Pressure 3000 psig Inlet 750 psig Outlet	Wallace O. Leonard PN 187040-2	75M50182	
A5167	1	Regulator, Dome Loaded	Primary Regulator 3000 psig Inlet 750 psig Outlet	Grove Mod. 201B	75M01356-1	
A5168	1	Valve, Relief	Relief at 875 ±44 psig Reseat at 790 psig min.	Fluid Mechanics PN 2-847	10430216-3	
A5169						
A5170						

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5171	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A5172	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN HP299T1-6TT	10430233-2	
A5173	1	Valve, Shuttle	1/4 in.	Clary PN 524255	10434448	
A5174	1	Switch, Pressure	Actuates at 625 ±15 psig Deactuates at 40 psid max. Below Actuation Pressure	Southwestern Ind. Inc. PN PS5116-625	10434443-6	55A6A4
A5175						
A5176	1	Gage, Pressure	0 to 1000 psig - Range 750 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-11	
A5177	1	Valve, Manual	3/4 in.	Marotta PN 223143-2	75M51064-2	
A5178	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A5179	1	Valve, Check	3/8 in., Cracking Pressure 4 psig, GN2	James, Pond, & Clark PN HP299T1-6TT	10430233-2	
A5180	1	Valve, Shuttle	1/4 in.	Clary PN 524255	10434448	
A5181	1	Switch, Pressure	Actuates at 625 ±15 psig Diff. Press. at 40 psi max.	Southwestern Ind. Inc. PN PS5116-625	10434443-6	55A6A16
A5182						

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5183	1	Gage, Pressure	0 to 1000 psig - Range 750 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-11	
A5184						
A5185	1	Regulator, Manual	Reference Pressure 3000 psig Inlet 290 psig Outlet	Wallace O. Leonard PN 186740-2	75M50182	
A5186	1	Regulator, Dome Loaded	Primary Regulator 3000 psig Inlet 290 psig Outlet	Grove PN M12951N	75M02156-2	
A5187	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A5188	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN 299T1-6TB	75M50149-2	
A5189	1	Valve, Relief	Relief at 380 ±20 psig Reseat at 3000 psig min.	James, Pond, & Clark PN 5159T1-6TT-380	75M02172-1	
A5190	1	Valve, Shuttle	1/4 in.	Clary PN 524255	10434448	
A5191	1	Switch, Pressure	Actuates at 185 ±15 psig Diff. Press. at 30 psi max.	Southwestern Ind. Inc. PN PS5116-185	10434443-12	55A6A15
A5192						
A5193	1	Gage, Pressure	0 to 600 psig - Range 290 psig - Normal Reading	Marsh PN 210-CSFMH	75M50147-9	
A5194	1	Valve, Solenoid	N.C.	Marotta PN 212783-1 (MW-130T)	10437739	55A6A14

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5195						
A5196	1	Regulator, Manual	Reference Pressure 3000 psig Inlet 550 psig Outlet	Rocketdyne PN 553645	10437906-9	
A5197	1	Orifice	.031 +.002 in. dia. .001 -.001	Rocketdyne PN 9504-45062	10430000	
A5198	1	Valve, Solenoid	N.C., 3-way	Marotta PN 202873-113 (MV-74)	75M01351	55A6A5
A5199	1	Regulator, Dome Loaded	Primary Regulator 3000 psig Inlet 550 psig Outlet	Grove PN 10977A085B	75M50341-2	
A5200	1	Valve, Relief	Relief at 700 ±35 psig Reseat at 565 psig min.	Fluid Mechanics PN 2-922	10430216-11	
A5201						
A5202	1	Valve, Shuttle	1/4 in.	Clary PN 524255	10434448	
A5203	1	Switch, Pressure	Actuates at 425 ±15 psig Max. Diff. Press. 35 psi	Southwestern Ind. Inc. PN PS5116-425	10434443-4	55A6A6
A5204						
A5205	1	Gage, Pressure	0 to 1000 psig - Range 490 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-11	
A5206						

FINDING NUMBER	NO. REQ'D	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5207						
A5208	1	Regulator, Manual	Reference Pressure 3000 psig Inlet 300 psig Outlet	Rocketdyne PN 553645	10437906-7	
A5209	1	Orifice	.031 +.002 -.001 in. dia.	Rocketdyne PN 9504-45062	10430000	
A5210	1	Valve, Solenoid	N.C., 3-way Primary Regulator 3000 psig Inlet 300 psig Outlet	Marotta ^a PN 202873-113(MV74)	75M01351	55A6A9
A5211	1	Regulator, Dome Loaded		Grove PN 10977A085B	75M50341-1	
A5212	1	Valve, Relief	Relief at 530 ± 30 psig Reseat at 430 psig min.	Fluid Mechanics PN 2-924	10430216-12	
A5213						
A5214	1	Valve, Shuttle	1/4 in.	Clary PN 524255	10434448	
A5215	1	Switch, Pressure	Actuates at 310 ± 15 psig Max. Diff. Press. 35 psid	Southwestern Ind. Inc. PN PS5116-310	10434443-13	55A6A10
A5216						
A5217	1	Gage, Pressure	0 to 800 psig - Range 300 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-10	
A5218						

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5219						
A5220	1	Regulator, Manual	Reference Pressure 3000 psig Inlet 240 psig Outlet	Rocketdyne PN 553645	10437906-8	
A5221	1	Orifice	.031 +.002 -.001 in. dia.	Rocketdyne PN 9504-45062	10430000	
A5222	1	Valve, Solenoid	N.C., 3-way	Marotta PN 202873-113 (MV74)	75M01351	55A6A11
A5223	1	Regulator, Dome Loaded	Primary Regulator 3000 psig Inlet 240 psig Outlet	Grove PN 10977A085B	75M50341-1	
A5224	1	Valve, Relief	Relief at 315 ±20 psig Reseat at 250 psig min.	Fluid Mechanics PN 2-921	10430216-13	
A5225						
A5226	1	Valve, Shuttle	1/4 in.	Clary PN 524255	10434448	
A5227	1	Switch, Pressure	Actuates at 195 ±15 psig Max. Diff. Press. 30 psid	Southwestern Ind. Inc. PN 5116-195	10434443-14	55A6A12
A5228						
A5229	1	Gage, Pressure	0 to 600 psig - Range 240 psig - Normal Reading	Marsh PN 210-CSFMH	75M50147-9	
A5230						

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5231						
A5232	1	Regulator, Dome Loaded	3000 psig Inlet 165 psig Outlet	Grove PN M12951N	75M02156-2	
A5233	1	Gage, Pressure	0 to 600 psig - Range 165 psig - Normal Reading	Marsh PN 210-CSFMH	75M50147-9	
A5234	1	Valve, Solenoid	3/8 in. N.C.	Marotta PN 212783-1 (MV130T)	10437739	55A6A13
A5235						
A5236						
A5237	1	Filter	5 micron, 98.6% nominal	Bendix PN 041675	10434444-3	
A5238	1	Filter	5 micron, 98.6% nominal	Bendix PN 041675	10434444-3	
A5239						
A5240						
A5241	1	Gage, Pressure	0 to 5000 psig - Range 3000 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-15	
A5242	1	Valve, Manual	1 in., Shut-off	Marotta SVP-29 PN 223774-1	75M51063-1	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5243						
A5244	1	Regulator, Manual	Reference Pressure 3000 psig Inlet 315 psig Outlet Primary Regulator 3000 psig Inlet 315 psig Outlet	Wallace O. Leonard PN 187040-2	75M50182	
A5245	1	Regulator, Dome Loaded		Grove PN 10988A066B	75M01356-1	
A5246	1	Valve, Relief	Relief at 140 ±7 psig Reseat at 130 psig min.	Fluid Mechanics PN 2-925	10430216-14	
A5247	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A5248	1	Valve, Check	3/8 in., Cracking Pressure 4 psig max.	James, Pond, & Clark PN P299T1-6TB	75M50149-2	
A5249	1	Valve, Shuttle	1/4 in. (Inoperative) Actuates at 300 ±15 psid Max. Diff. Press. 35 psid	Clary PN 524255	10434448	
A5250	1	Switch, Pressure		Southwestern Ind. Inc. PN PS5116-185	10434443-12	55A6A20
A5251						
A5252	1	Gage, Pressure	0 to 800 psig - Range 315 psig - Normal Reading	Marsh PN 210-3SSFMH	75M50147-10	
A5253						
A5254	1	Valve, Manual	1/2 in., Nitrogen Bypass	Marotta SPV-27 PN 223143-3	75M51064-3	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5255	1	Manifold	2 in., Vent	Grayloc Tool Company	75M02102	
A5256			A5256 through A5266 are not functionally applicable to this system.			
A5267	1	Valve, Manual	3/8 in.	Robbins PN NT-180	10437694	
A5268	1	Valve, Manual	1/2 in.	Marotta SPV-27 PN 223143-3	75M51064-3	
A5269	1	Valve, Manual	3/8 in.	Robbins PN NT-180	10437694	
A5270	1	Regulator, Dome Loaded	Primary Regulator 3000 psig Inlet 750 psig Outlet	Grove PN M12951N	75M02156-2	
A5271	1	Regulator, Manual	Reference Pressure 3000 psig Inlet 750 psig Outlet	Wallace O. Leonard PN 187040-2	75M50182	
A5272	1	Valve, Manual	3/8 in., Vent	Robbins PN NT-180	10437694	
A5273	1	Valve, Relief	Relief at 850 ±43 psig Reseat at 770 psig min.	James, Pond, & Clark PN 5159T1-6TR-1020	75M02172-3	
A5274	1	Valve, Shuttle	1/4 in. (Inoperative)	Clary PN 524255	10434448	
A5275	1	Switch, Pressure	Actuates at 625 ±15 psig Max. Diff. Press. 35 psid	Southwestern Ind. Inc. PN PS5116-625	10434443-6	55A6A8
A5276						

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5277	1	Gage, Pressure	0 to 1500 psig - Range 750 psig - Normal Pressure	Marsh PN 210-3SSFMH	75M50147-12	
A5278						
A5279						
A5280	1	Regulator, Pressure	1/4 in., Inlet 3000 psig Outlet 450 ±20 psig	W. O. Leonard PN 128390-4	75M50726-2	
A5281	1	Gage, Pressure	0-800 psig - Range	Marsh PN 0-800, 210-3SSFMH	75M50147-10	
A5282 through A5286 are not functionally applicable to this system.						
A5287	1	Valve, Manual	1/4 in., Bypass	Cardair PN 3510-0083	75M51076-1	
A5288	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A5289	1	Valve, Manual	1/4 in., Shut-Off	Robbins PN SSNA 250-4T-787	75M01305-1	
A5290	1	Valve, Manual	1/4 in., Vent	Robbins PN SSNA 250-4T-787	75M01305-1	
A5291	1	Switch, Pressure	Actuates at 15 ±5 psig Deactuates at 5 psig	Custom PN 8G46	10430405	55A6A23
A5292	1	Valve, Manual	1/2 in., Bypass	Marotta SPV-27 PN 223143-3	75M51064-3	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5293	1	Valve, Check	1/4 in.	James, Pond, & Clark PN 299T1-4TB	75M50149-1	
A5294	1	Valve, Check	1/4 in.	James, Pond, & Clark PN H299T1-4TT	10430233-1	
A5295						
A5296	1	Valve, Relief	1/4 in.	James, Pond, & Clark PN 5159T1-4TB-600	10430079-6	
A5297 through A5402 are not functionally applicable to this system.						
A5403	1	Valve, Shuttle	1/4 in., 3-way	Clary Dynamics PN 524255	10434448	
A5404						
A5405						
A5406	1	Valve, Check	1/4 in., Cracks at 4 psig max.	James, Pond, & Clark PN H299T1-4TT	10430233-1	
A5407	1	Valve, Check	1/4 in., Cracks at 4 psig max.	James, Pond, & Clark PN H299T1-4TT	10430233-1	
A5408 through A5800 are not functionally applicable to this system.						
A5801	1	Valve, Manual		Robbins Aviation PN SSNA-375A-6T-768	75M01305-2	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5802	1	Filter	3/8 in., 10-micron	Permanent Filter Corp. PN 10813	10437650	
A5803	1	Valve, Check	3/8 in., Cracking Pressure 3 psig max.	James, Pond, & Clark PN HP279T1-6TT	75M02676	
A5804	1	Valve, Manual	Vent	Robbins Aviation PN SSNA-250-4T-787	75M01305-1	
A5805	1	Calibrated Bleed			75M02048	
A5806	1	Accumulator	150 cu. in.		75M05639	
A5807	1	Gage, Pressure	0 to 1000 psig - Range	U. S. Gauge PN AW1827AH01	10437806-6	
A5808	1	Switch, Pressure	Actuates at 600 psig	Southwestern Ind. Inc. PN PS5116-600	10434443-10	57A258-A2A3
A5809	1	Cover Assembly, Q-Ball			50M32049	
A5810	1	Valve, Solenoid	N.C., 3-way	Marotta MV123 PN 204424	10425701	57A258-A241
A5811	1	Regulator, Manual	750 psig inlet 30 psig outlet	Grove PN 10928BA3B	75M50165-4	
A5812	1	Orifice			75M01779	
A5813	1	Calibrated Bleed			75M02048	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A5814	1	Valve, Check	Cracking Pressure .5-1.0 psig	James, Pond, & Clark PN 279T-6BB	10434518	
A5815	1	Gage, Pressure	0 to 50 psig - Range	U. S. Gauge PN AW1827AF01	10437806-1	
A5816	1	Accumulator	60 cu. in.		75M06197	
A5817	1	Valve, Manual	Vent	Robbins Aviation PN SSNA-250-4T-787	75M01305-1	
A5818	1	Calibrated Bleed			75M02048	
A5819	1	Switch, Pressure	Actuates at 10 psig	Southwestern Ind. Inc. PN FS3704-10	10434297-2	57A258-A2A2
A5820						
A5821	1	Valve, Solenoid	N.C., 3-way	Marotta MV123 PN 204424	10425701	57A258-A2A4
A5822	1	Retract Cylinder	2 in. dia., 48 in. length	Hannifin Co. Model No. CBB-HLS13	10427203	
A5823	1	Orifice	.015 in. dia.		75M02852	
A5824 through A6057 are not functionally applicable to this system.						
A6058	1	Valve, Manual	Vent	Futurecraft PN 30416S	75M50161-9	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A6059	1	Valve, Check		James, Pond, & Clark PN H249T1-16TT	10430234-5	
A6060		A6060 through A6081 are not functionally applicable to this system.				
A6082	1	Orifice	.031 in. dia. Enclosure Purge Inlet	A. U. Stone PN H228-031	75M50562-1	
A6083						
A6084	1	Valve, Pneumatic	T. C. Fuel Injector Purge Vent N.C.	Rocketdyne PN 401359		
A6085	1	Valve, Solenoid	3-way, 2 position N.O.	Marotta PN 202873-113 (MV-74)	75M01351	53A10A1
A6086	1	Valve, Solenoid	3-way, 2 position N.C.	Marotta PN 202873-113 (MV-74)	75M01351	53A10A2
A6087	1	Calibrated Bleed	Enclosure Purge Outlet		75M02047	
A6088	1	Valve, Relief	Checking - Relief Cracks at 3 psig	James, Pond, & Clark PN P-4-698-3	75M00178	
A6089	1	Valve, Relief	Checking - Relief Cracks at 3 psig	James, Pond, & Clark PN P-4-698-3	75M00178	
A6090		A6090 through A6501 are not functionally applicable to this system.				
A6502	1	Coupling-Half, Quick Disconnect	240 psig GN2	E.B. Wiggins Oil Tool Co. Inc. PN 6400R107A16	75M02214	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A6503	1	Coupling-Half, Quick Disconnect	550 psig GN ₂	E.B. Wiggins Oil Tool Co. Inc. PN 6400R107A20	75M02211	
A6504	1	Coupling-Half, Quick Disconnect	240 psig GN ₂	E.B. Wiggins Oil Tool Co. Inc. PN 6400R107A16	75M02214	
A6505						
A6506	1	Orifice	.030 dia.		75M04165-2	
A6507		A6602 are not functionally applicable to this system.				
A6603	1	Coupling-Half, Quick Disconnect	3000 psig GN ₂	E.B. Wiggins Oil Tool Co. Inc. PN 6400R109A6	75M02209	
A6604						
A6605						
A6606	1	Orifice	.030 dia.		75M04165-2	
A6607						
A6608	1	Coupling-Half, Quick Disconnect	300 psig GN ₂	E.B. Wiggins Oil Tool Co. Inc. PN 6400R107A16	75M02214	
A6609		A6627 are not functionally applicable to this system.				

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
A6628	1	Orifice	.063 dia.		75M05177	
A6629	through	B197	are not functionally applicable to this system.			
B198	1	Sphere			20M00937	
B199	1	Sphere			20M00935	
B200	1	Coupling-Half, Quick Disconnect	3/8 in., 3000 psig GN2	E.B. Wiggins Oil Tool Co. Inc. PN 6005 R67A6	20M30140	
B201	1	Filter	3/8 in., 25 micron	Walter Kidde & Co. PN 840473	20M30127	
B202	1	Valve, Check	3/8 in.	James, Pond, & Clark PN P279T-6BB (L)	20M30124	
B203	1	Switch, Pressure	Actuates at 2835 ±100 psig Deactuates at 2600 psig	Southwestern Ind. Inc. PN PS 13800-2800	20M30130	9A52
B204	1	Valve, Manual	1/4 in., 3-way	Benton Corp. PN B-17500	10414076	
B205	1	Sphere	3000 psig GN2 1.0 cu. ft.	Bendix Aviation Corp. PN 19E-23-29UD	20M00837	
B206	1	Sphere	3000 psig GN2 1.5 cu. ft.	Bendix Aviation Corp. PN 19E-23-12UD	20M00837	
B207	1	Valve, Solenoid	N.C., 5-port	Marotta Valve Corp. PN 213854	20M30131	9A51

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
B208	1	Filter	3/8 in., 25 micron	Walter Kidde & Co. PN 840473	20M30127	
B209	1	Regulator, Manual	3000 psig Inlet 750 psig Outlet	Rocketdyne PN 550278	20M30134	
B210	1	Valve, Relief	Relief at 950 ±50 psig Reset at 845 psig min.	Rocketdyne PN 550435	20M30137	
B211	1	Manifold	750 psig GN2		20M00878	
B212	1	Valve, Manual	1/4 in., 3-way	Benton Corp. PN B-17500	10414076	
B213	1	Switch, Pressure	Actuates at 625 ±25 psig Deactuates at 575 psig	Southwestern Ind. Inc. PN PS-5100A	20M30135	9A53
B214 through B216 are not functionally applicable to this system.						
B217-1	1	Valve, Solenoid	N.C.	Marotta PN 218263-113 (MV-74)	20M30128	9A25
B217-2	1	Valve, Solenoid	N.C.	Marotta PN 218263-113 (MV-74)	20M30128	9A28
B217-3	1	Valve, Solenoid	N.C.	Marotta PN 218263-113 (MV-74)	20M30128	9A31
B217-4	1	Valve, Solenoid	N.C.	Marotta PN 218263-113 (MV-74)	20M30128	9A34
B217-5	1	Valve, Solenoid	N.C.	Marotta PN 218263-113 (MV-74)	20M30128	9A37

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
B217-6	1	Valve, Solenoid	N.C.	Marotta PN 218263-113 (MV-74)	20M30128	9A40
B217-7	1	Valve, Solenoid	N.C.	Marotta PN 218263-113 (MV-74)	20M30128	9A43
B217-8	1	Valve, Solenoid	N.C.	Marotta PN 218263-113 (MV-74)	20M30128	9A46
B218	8	Orifice	.046 +.001 -.000 in. dia.		10414595	
B219	10	Orifice	.018 +.002 -.000 in. dia.		20M00982	
B220	1	Valve, Solenoid	N.C.	Marotta PN 20593-12	20M30160	9A9
B221-1	8	Calorimeter Assembly			50M10311	
B221-2	1	Calorimeter Assembly			50M10353	
B221-3	1	Calorimeter Assembly			50M10445	
B222 through B230 are not functionally applicable to this system.						
B231	1	Valve, Check	3/4 in.	Marotta PN 204022 (CMV 12)	20M30132	
B232	2	Sphere, Triplex	3000 psig GN2 3 cu. ft.	Bendix Aviation Corp. PN 19E-23-22VD	20M00936	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
B233	1	Valve, Solenoid	N.C.	Marotta PN 225317-1	20M30171	11A68
B234	1	Valve, Solenoid	N.C.	Marotta PN 225317-1	20M30171	11A69
B235	1	Manifold	3000 psig GN ₂ , Distributor		20M00906	
B236	1	Valve, Solenoid	N.C.	Marotta PN 225317-1	20M30171	11A70
B237	1	Valve, Solenoid	N.C.	Marotta PN 225317-1	20M30171	11A71
B238	1	Valve, Solenoid	N.C.	Marotta PN 225317-1	20M30171	11A72
B239	1	Valve, Solenoid	N.C.	Marotta PN 225317-1	20M30171	11A73
B240	1	Valve, Solenoid	N.C.	Marotta PN 225317-1	20M30171	11A74
B241	1	Valve, Solenoid	N.C.	Marotta PN 225317-1	20M30171	11A79
B242	1	Valve, Solenoid	N.C.	Marotta PN 225317-1	20M30171	11A80
B243	1	Sphere	3000 psig GN ₂		20M00905	
B244 through B249 are not functionally applicable to this system.				E.B. Wiggins Oil Tool Co. Inc. PN 6005R104A12	20M30133	
B250	1	Coupling-Half, Quick Disconnect	3/4 in. 3000 psig GN ₂			

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
B251	1	Filter	3/4 in.	Permanent Filter Corp. PN 20030	20M30129	
B252	1	Valve, Check	3/4 in.	Marotta PN 204022 (CMV12)	20M30132	
B253	2	Sphere	3000 psig GN ₂ 20 cu. ft.			
B254 through B256 are not functionally applicable to this system.					20M00414	
B257	1	Valve, Manual	1/4 in., 3-way	Benton Corp. PN B17500	10414076	
B258	1	Switch, Pressure	Actuates at 2835 ±100 psig Deactuates at 2600 psig	Southwestern Ind. Inc. PN PS 3800-2800	20M30130	11A51
B259 through B399 are not functionally applicable to this system.						
B400	1	Coupling-Half, Quick Disconnect	1/4 in., 3000 psig helium	E.B. Wiggins Oil Tool Co. Inc. PN 6105R102A4	20M30389	
B401	1	Filter	3/8 in. 20 micron	Cosmic Fairchild PN 30474	20M30414	
B402	1	Valve, Check	1/4 in.	Wallace O. Leonard Inc PN 155040-2	20M30339	
B403	1	Switch, Pressure	Actuates at 2835 ±100 psig Deactuates at 2600 psig	Southwestern Ind. PN PS 3800-2800	20M30130	11A52
B404	1	Valve, Manual	1/4 in.	Benton Corp. PN B-15600	10414087	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
B405	1	Bottle	3000 psig Helium 50 cu. in.	Airtite Products, Inc.	20M00449	
B406	1	Regulator, Preset	3000 psig Inlet 450 ± 20 psig Outlet	Wallace O. Leonard PN 128390-2	20M30157	
B407						
B408	1	Valve, Solenoid Assy.	N.C., 2-way	Marotta PN 224613	20M30380	11A67
B409	1	Transducer, ΔP	± 1 psid - Range 1/4 in.	Statham Instruments, Inc.	50M10201	10A540
B410	1	Transducer, ΔP	± 1 psid - Range 1/4 in.	Statham Instruments, Inc.	50M10201	10A541
B411	1	Transducer, ΔP	± 1 psid - Range 1/4 in.	Statham Instruments, Inc.	50M10201	10A406
B412	1	Transducer, ΔP	± 1 psid - Range 1/4 in.	Statham Instruments, Inc.	50M10201	10A406
B413	1	Transducer, ΔP	± 1 psid - Range 1/4 in.	Statham Instruments, Inc.	50M10201	10A538
B414	1	Transducer, ΔP	± 1 psid - Range 1/4 in.	Statham Instruments, Inc.	50M10201	10A539
B415	1	Valve, Solenoid	N.C., 2-way	Marotta PN 224613	20M30380	22A66
B416	12	Valve, Constant Flow	Orifice 1/4 in.	Wallace O. Leonard PN 156070-2	20M30120	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
B417	1	Regulator, Preset	3000 psig Inlet 450 ±20 psig Outlet	Wallace O. Leonard PN 128390-2	20M30157	
B418	2	Valve, Constant Flow	Orifice Inlet pressure; 450 ±20 psig Outlet pressure; 0 to 150 psig	Wallace O. Leonard PN 156070-2	20M30120	
B419	2	Valve, Check	1/4 in.	Wallace O. Leonard PN 155040-2	20M30339	
B420	2	Constant Flow Valve	1 1/4 in., Orifice Inlet Pressure; 3000 50 psig Outlet Pressure; 800 to 900 psig	Wallace O. Leonard PN 156070-3	20M30383	
B421	1	Valve, Check	Inlet Pressure; 3000 50 psig Outlet Pressure; 800 to 900 psig	Wallace O. Leonard PN 155040-2	20M30339	
B422	1	Sphere, Triplex	3000 psig GN2 3 cu. ft.		10438020	
B423 through E199 are not functionally applicable to this system.						
E200	1	Coupling-Half, Quick Disconnect	3000 psig Helium	DAC (Douglas Aircraft Co.) PN 7851823-503		
E201	1	Valve, Check		DAC PN 7851822-1		
E202	1	Sphere	3000 psig Helium 3.5 cu. ft.	DAC PN 7851820-1		
E203	1	Valve, Solenoid	N.C.	DAC PN 7851825-1		
E204	1	Valve, Relief	Relief at 3250 150 psig Reseat at 3100 psig Approx.	DAC PN 7851824-501	407W12L3	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
E205	1	Filter	10 micron	DAC PN 7851840-1		
E206	1	Regulator, Preset	3000 \pm 100 psig Inlet 455 \pm 25 psig Outlet	DAC PN 7851821-501		
E207	1	Valve, Solenoid	N.O.	DAC PN 7851825-501		407W12L4
E208-1	1	Switch, Pressure	Actuates at 550 \pm 8 psig Deactuates at 510 \pm 10 psig	DAC PN 7851830-1		407W12S1
E208-2	1	Switch, Pressure	Actuates at 550 \pm 8 psig Deactuates at 510 \pm 10 psig	DAC PN 7851830-1		407W12S13
E209 through E216 are not functionally applicable to this system.						
E217	1	Valve, Check		DAC PN 7851822-1		
E218	1	Sphere	3000 psig Helium 1.5 cu. ft.	DAC PN 5693830		
E219	1	Switch, Pressure	Actuates at 2940 \pm 25 psig Deactuates at 2840 \pm 25 psig	DAC PN 7851830-503		407W12S5
E220	1	Switch, Pressure	Actuates at 445 \pm 5 psig Deactuates at 435 \pm 5 psig	DAC PN 7851830-501		407W12S4
E221 through E261 are not functionally applicable to this system.						
E262	1	Valve, Check		DAC PN 7851843-1		

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
E263	1	Orifice	.037 in. dia.	Deel Mfg. Co. PN R4-8		
E264	1	Valve, Solenoid	N.O.	DAC PN 1A22472-1		407W12L12
E265						
E266	1	Coupling-Half, Quick Disconnect	3000 psig Helium	DAC PN 1A22470-1		
E267	1	Orifice	.059 in. dia.	DAC PN S-4851838C8-084		
E268	6	Orifice	.055 in. dia.	DAC PN S-4851838C4-055		
E269						
E270						
E271	1	Plenum	Helium 424 cu. in.	DAC PN 1A58515-1		
E272	1	Coupling-Half, Quick Disconnect	3000 psig helium	DAC PN 1A22469-1		
E273 through E281 are not functionally applicable to this system.						
E282	1	Valve, Check		DAC PN 78511822-1		

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SIM
E283			E283 through E314 are not functionally applicable to this system.			
E315	1	Switch, Pressure	Actuation at 2940 ± 25 psig Deactuation at 2840 ± 25 psig minimum	DAC PN 7851830-503	407W12S10	
E316			E316 through G499 are not functionally applicable to this system.			
G500	1	Coupling-Half, Quick Disconnect	3/8 in., 3000 psig GN2	E. B. Wiggins Oil Tool Co. Inc. PN 6005R67A6	20M30140	
G501	1	Filter	3/8 in. 20 micron	Cosmic-Fairchild PN 30474	20M30414	
G502	1	Valve, Check	3/8 in.	James, Pond, & Clark PN P279T-6BB (L)	20M30124	
G503	1	Sphere	3000 psig GN2 1 cu. ft.		20M00976	
G504	1	Valve, Manual	1/4 in., 3-Way	Benton Corp. PN B-17500	20M30436-1	
G505	1	Switch, Pressure	Actuation at 2835 ± 100 psig Deactuation at 2600 psig min.	Southwestern Ind. Inc. PN PS 3800-2800	20M30130	801A10
G506	1	Switch, Pressure	Deactuation at 1375 ± 33 psig Actuation at 70 psig Increase above Deactuation Pressure	Southwestern Ind. Inc. PN PS-3800-D1375	20M30159	801A12
G507	1	Regulator and Heater Assembly	300 to 3000 psig Inlet 10 to $30 \pm .2$ psig Outlet	Wallace O. Leonard PN 200400-2	20M30476-1	802A39
G508	1	Manifold Assembly	Operating Pressure 35 psig		20M01023-1	

FINDING NUMBER	NO. REQD	COMPONENT	REMARKS	VENDOR	DRAWING NUMBER	ELEC SYM
G509	1	Thermostat			10414079	
G510	1	Filter	3/8 in. 20 micron	Cosmic-Fairchild PN 30474	20M30414	
G511	1	Transducer, Pressure	0-3500 psig Range	Bourns Labs. Model 725	50M10373	802A418
G512						
G513	1	Temperature Housing Assembly	Operating Pressure 3000 psig		10M21162	
G514	1	Temperature Sensor	Regulator input		50M12203	802A492
G515	1	Temperature Sensor	Regulator output		10420611	802A400
G516	1	Valve, Manual	1/4 in. 3-way	Benton Corp. PN B-17500	20M30436-1	
G517	1	Transducer, Pressure	0-60 psid Range	Servonic Instruments Inc. Model L-162-8	50M10292	802A419
G518	1	Valve, Manual	1/4 in., 3-way	Benton Corp. PN B17500	20M30436-1	
G519 through H7 are not functionally applicable to this system.						
H8	1	Q-Ball		Nortronics PN F-16	50M30645	

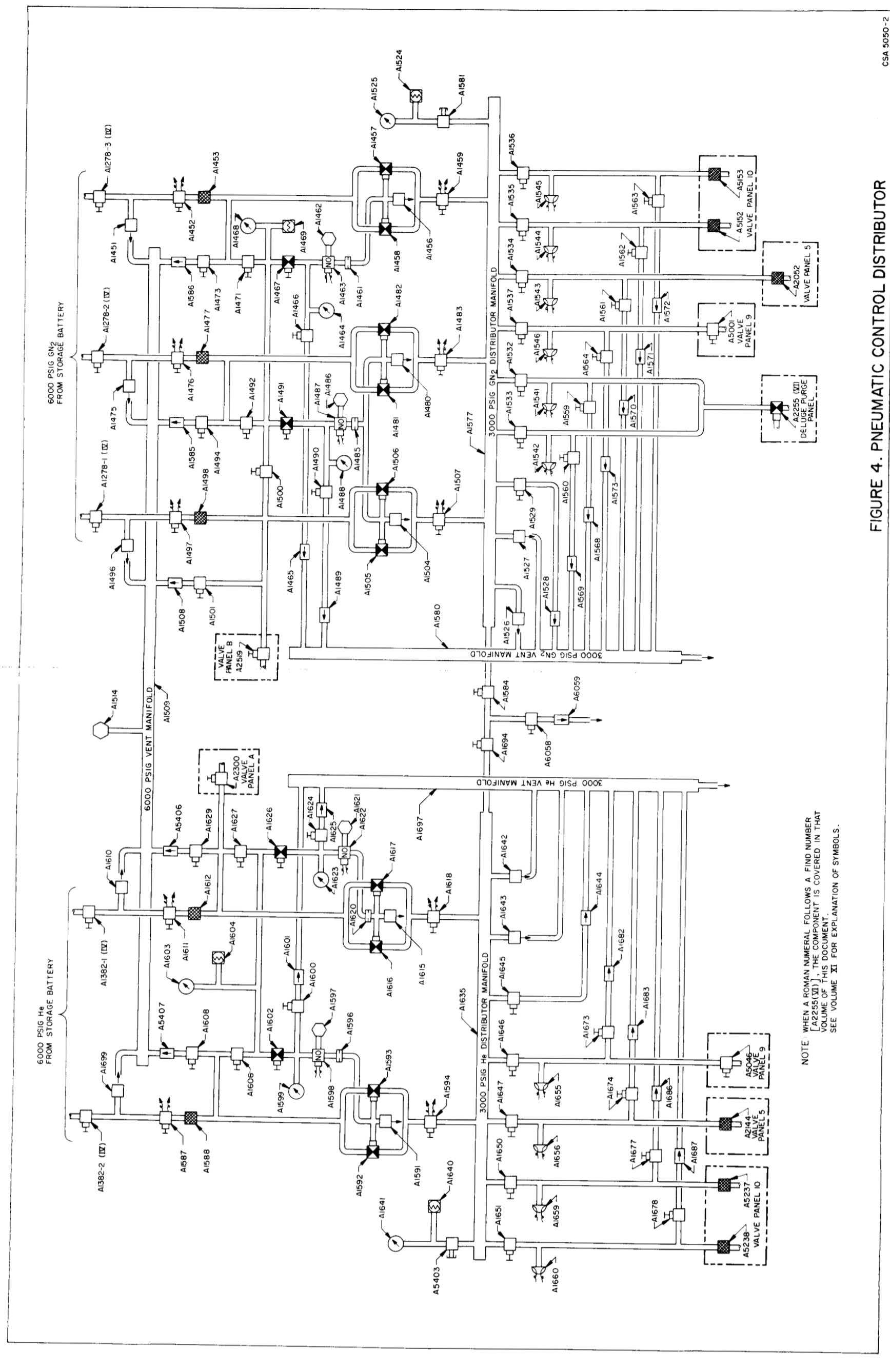
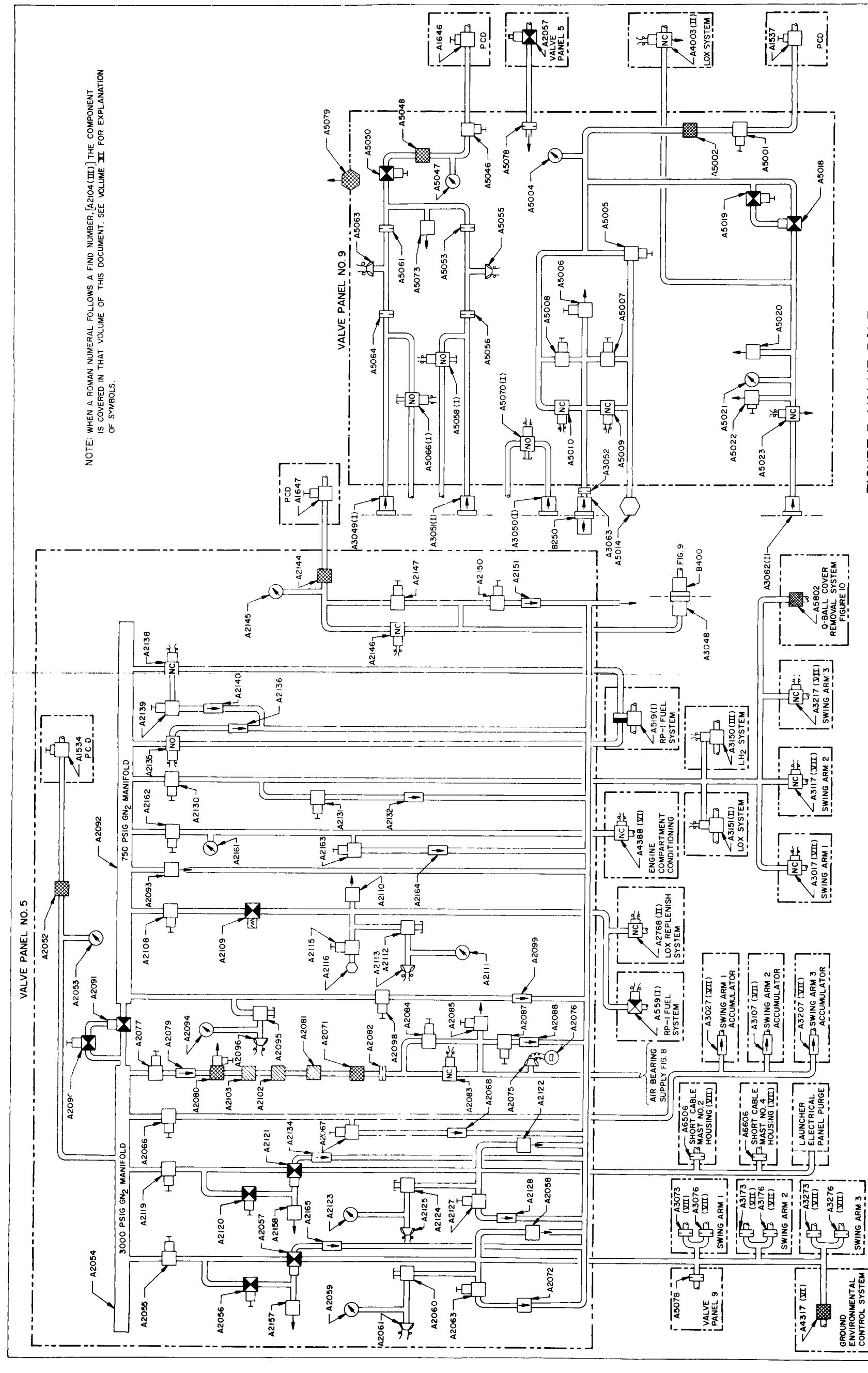


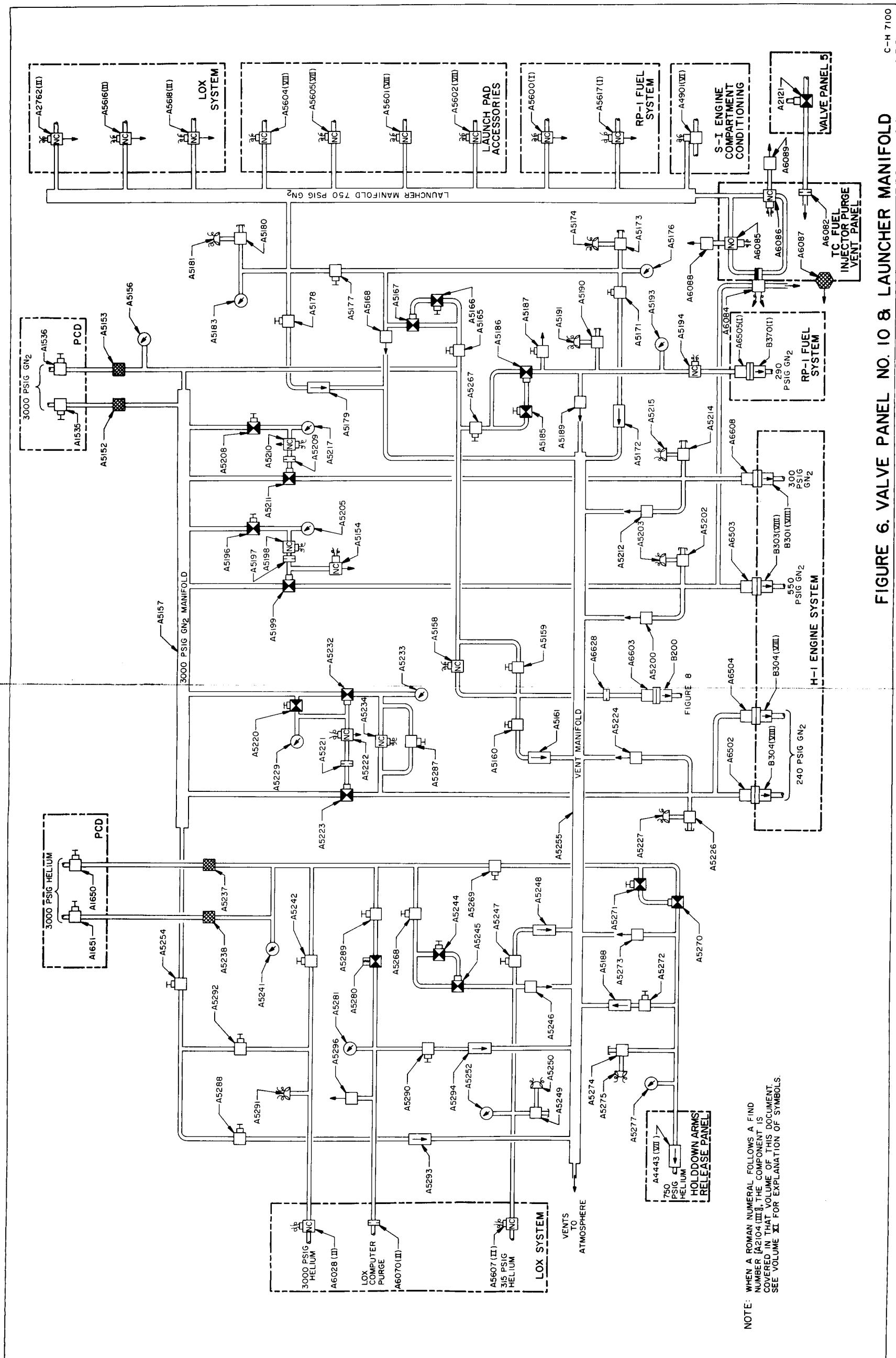
FIGURE 4. PNEUMATIC CONTROL DISTRIBUTOR

NOTE: WHEN A ROMAN NUMERAL FOLLOWS A FIND NUMBER
[A2255(VI)], THE COMPONENT IS COVERED IN THE
VOLUME OF THIS DOCUMENT.
SEE VOLUME XI FOR EXPLANATION OF SYMBOLS.

FIGURE 5. VALVE PANELS NO. 5 & 9

NOTE: WHEN A ROMAN NUMERAL FOLLOWS A FIND NUMBER, [A204(III)] THE COMPONENT IS COVERED IN THAT VOLUME OF THIS DOCUMENT. SEE VOLUME **III** FOR EXPLANATION OF SYMBOLS.





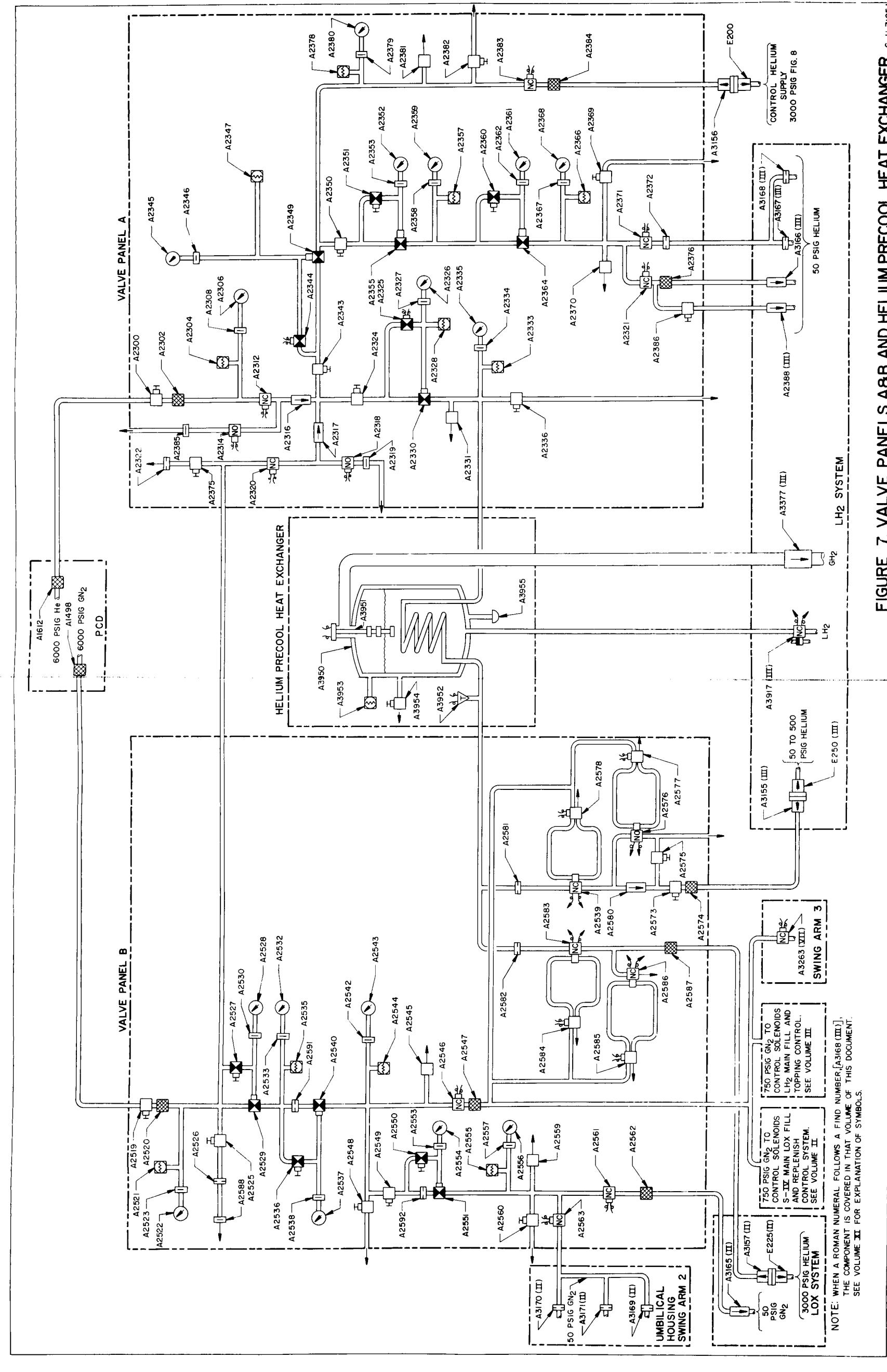
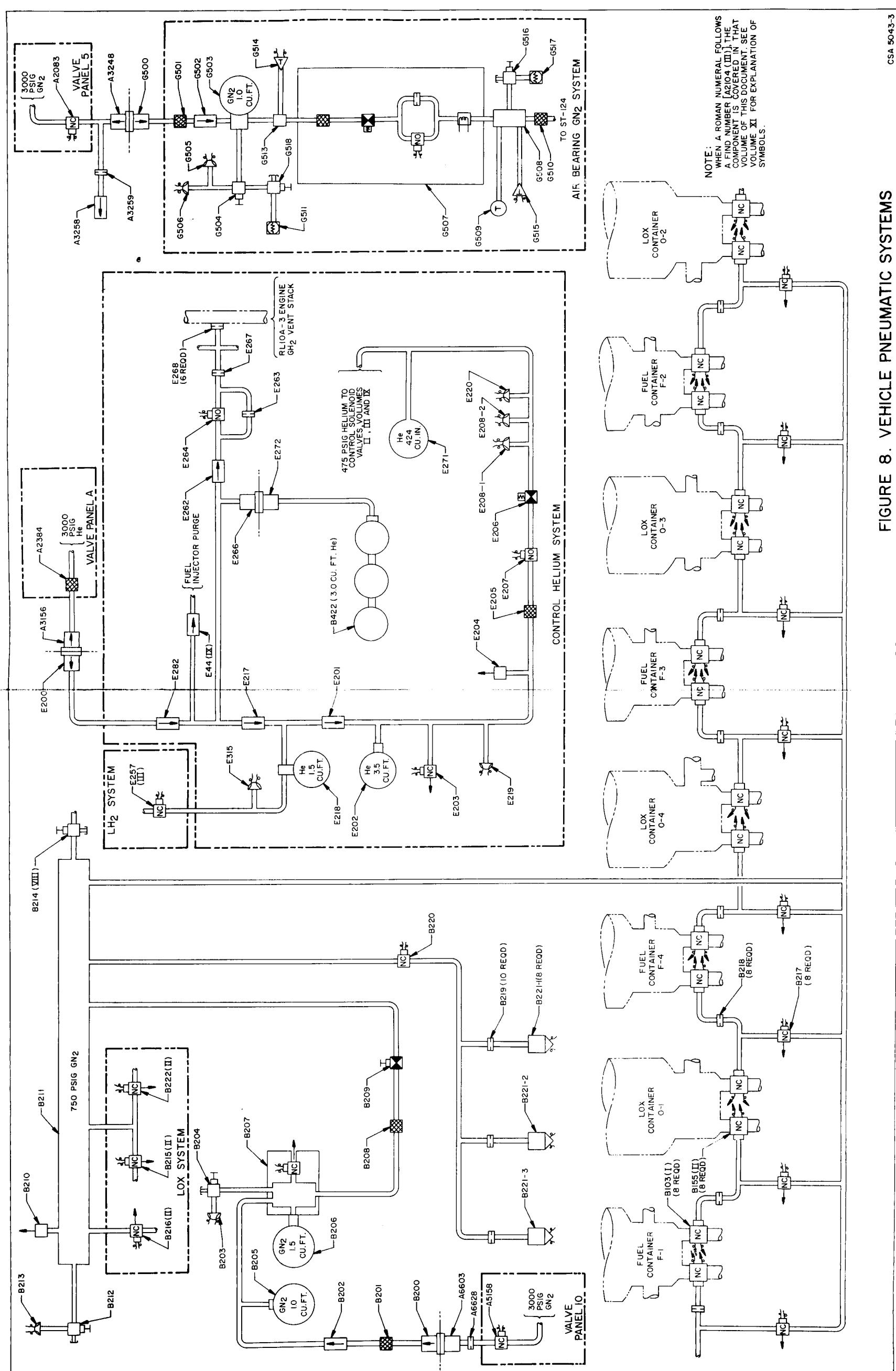


FIGURE 7. VALVE PANELS A&B AND HELIUM PRECOOL HEAT EXCHANGER C-H 7105-H

SEE VOLUME **XX** FOR EXPLANATION OF SYMBOLS.



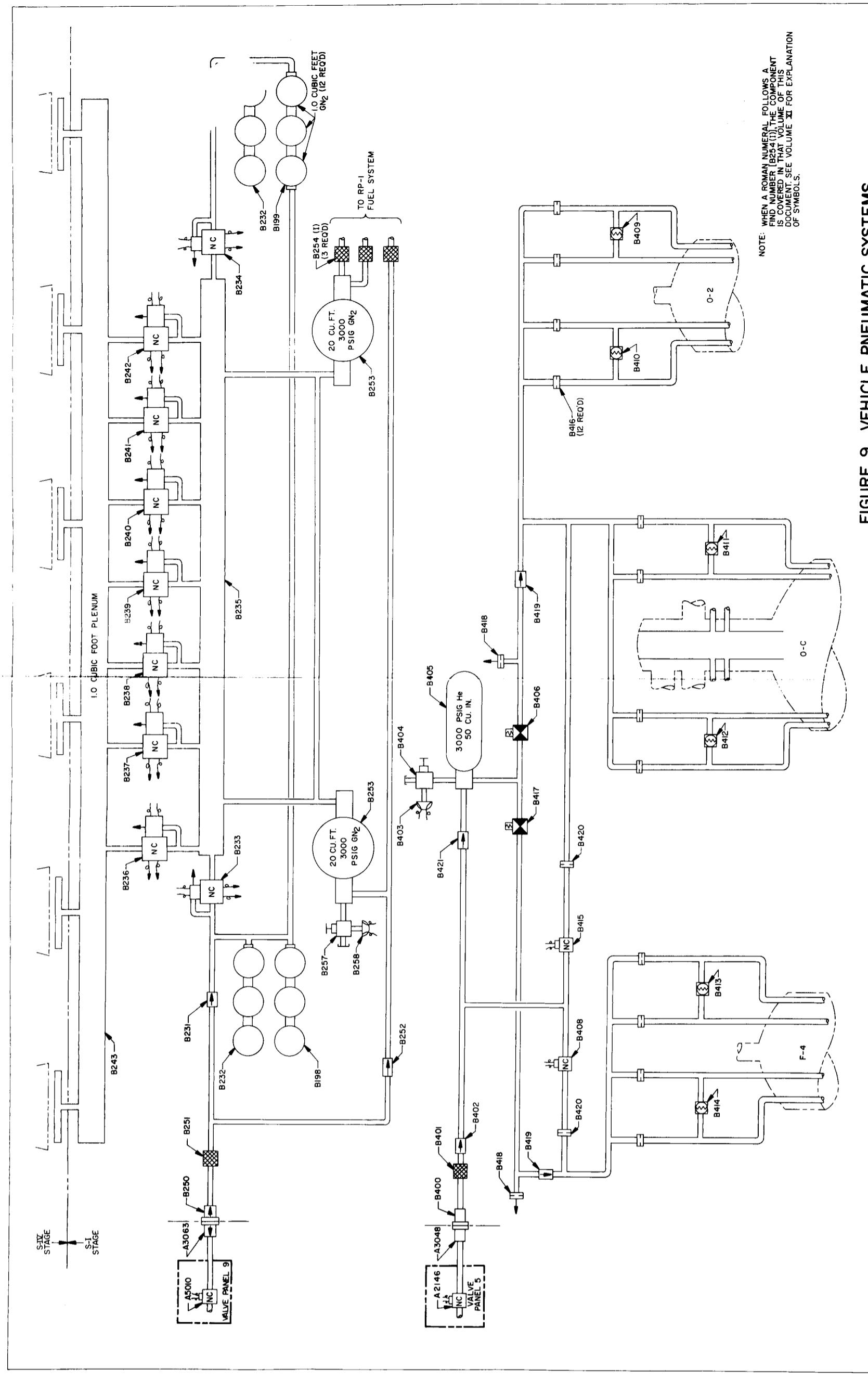
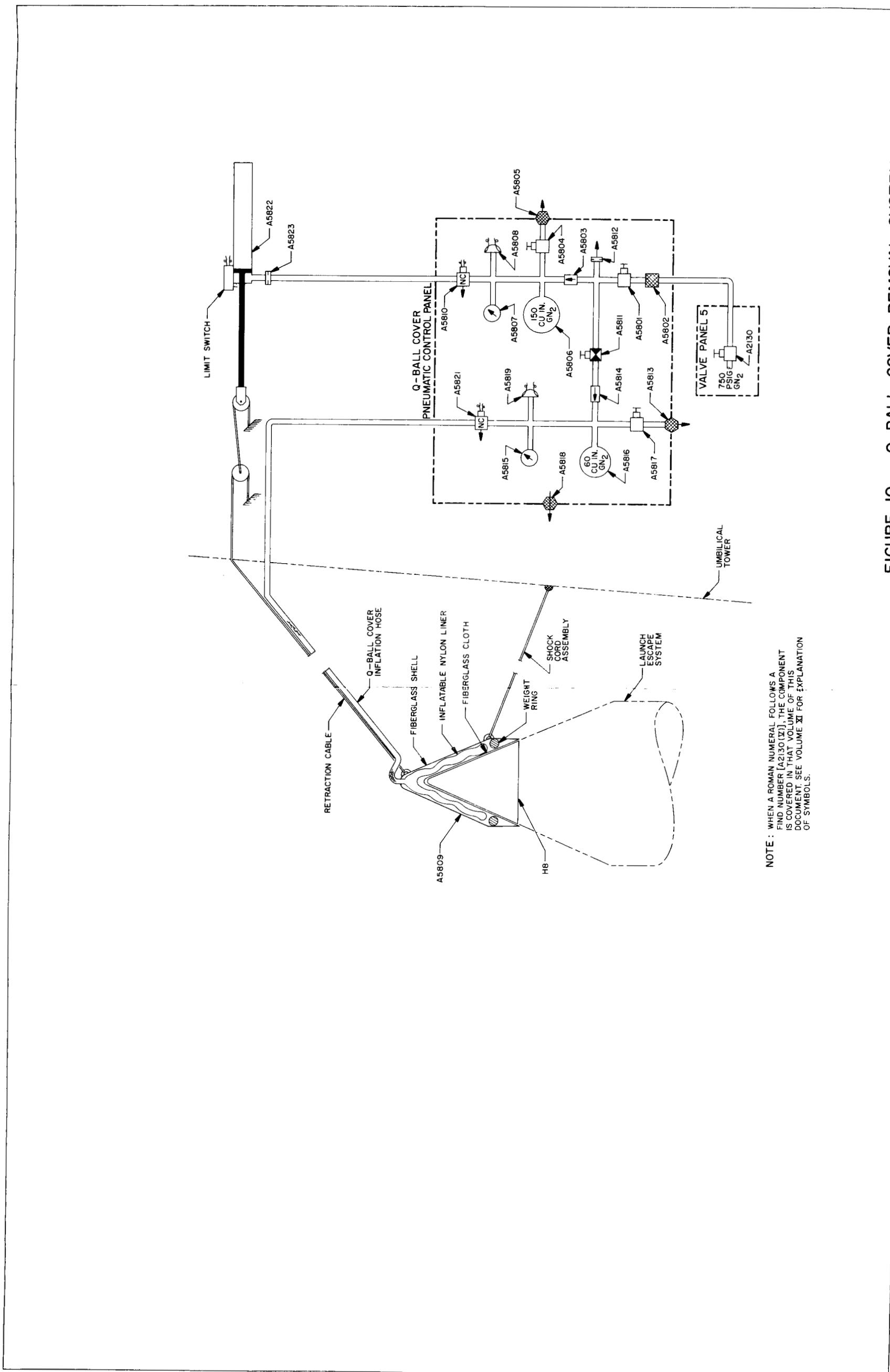


FIGURE 9. VEHICLE PNEUMATIC SYSTEMS



NOTE : WHEN A ROMAN NUMERAL FOLLOWS A
FIGURE NUMBER [A2130(X)], THE COMPONENT
IS COVERED IN THAT VOLUME OF THIS
DOCUMENT. SEE VOLUME XII FOR EXPLANATION
OF SYMBOLS.

FIGURE 10. Q-BALL COVER REMOVAL SYSTEM

CSA 5049

DISTRIBUTION

CCSD-HO (Dept. 4600), BALFOUR, C.L. (10)	K-VG, RIGELL, I. (2)
CCSD-NO (Dept. 2714), BEAMER, W. (14)	K-VG2, GREENFIELD, T.
CCSD-NO (Dept. 2240), SIMMONS, F. (2)	K-VG22, DOWLING, C. (4)
CCSD-NO (Dept. 2752), BECK, R.C.	K-VG23, ROUSE, C. (4)
DAC (Dept. A2-857), BELWOOD, H.	K-VL, GREENE, D. (5)
DAC, KEATING, J.	K-VL, WHISENANT, E. (2)
DAC, HOLLISTER, R. (Dept. A3-770)	K-VM, PICKETT, A.
I-I/IB-SIV, FERGUSON, W.	K-VM2, ROBINSON, G.
I-I/IB-SIVH, LEAGUE, R.	K-VM2, RAINWATER, W.
I-I/IB-SIVL/DAC, STOOPS, G.	K-VM3, PANTOLIANO, T. (3)
I-I/IB-SIVL-NASA/DAC-SACTO, TYSON, O.	K-VM22, DeLaROSA, H.
I-I/IB-SIVL-NASA/DAC-SANTA MONICA, WEAVER, E.	K-VM4, FANNIN, L. (8)
I-MICH-OA, STEVENSON, H.	K-VM23, SCOVILLE, D.
I-MICH-OA, QUINTON, H.	K-VM24, HILL, L.
K-BS27, WHISENANT, R.	LVO-DIR, WILLIAMS, M.
K-DA, POPPEL, T.	LVO-AD, ZEILER, A.
K-DE2, HAHN, R.	LVO-L, BELLAMY, E. (5)
K-DE2, GRIFFIN, F.	R-ASTR-E, FICHTNER, H.
K-DE2, DZIADON, E. (2)	R-ASTR-EA, SMITH, R. (5)
K-DE2, REID, R.	R-ASTR-EAA, PASCHAL, L.
K-DE2, MOORE, R.	R-ASTR-ES, ADEN, R. (3)
K-DE2, STAHLER, S.	R-ASTR-ESI, MILNER, R.
K-DE2, CHAPPLE, E.	R-ASTR-I, HOBERG, O.
K-DE2, HEROLD, C.	R-ASTR-IM, POWELL, J.
K-DE4, DOWNS, J.	R-ASTR-TR, WAGNON, W.
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